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No. XII. OF VOL. II., 1925. LONDON, SATURDAY, SEPTEMBER 19, 1925. Pp. 112—Price 1s.
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ON

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John Hunter studied the circulation of blood through the lungs, and with his accustomed practical genius he exposed part of the lungs of a dog and watched the changes taking place in them under conditions of artificial respiration maintained by specially constructed bellows. He has left on record the observations he made,[1] and writes these words:

"The diminution of the heart's motion upon stopping respiration does not depend upon the immediate impression of improper blood on the left auricle and ventricle as a sedative, but upon the sympathetic connexion which exists between the heart and lungs (one action ceasing the other also ceases); which sympathy is established, because if the heart were to continue acting it would send improper blood into the body, by which it can be supported only a little while. The right auricle and ventricle also cease acting, although not so early, and for the same reasons; because on the cessation of the function of the lungs the blood cannot receive any benefit in passing through them. These actions and cessations are all dependent on life and the connexion of one action with another."

No better words could possibly be found to express the object of the present paper. I shall attempt to describe what I imagine to be one of "the connexions of one action with another," and to show how the larynx serves an important function in preventing the heart from sending "improper blood" into the body. I wish to add what I imagine to be one link to the work carried out by Hunter and only hope that my efforts are worthy of the illustrious investigator whose researches were based on close observation, reasoned interpretation, and an earnest desire for the discovery of truth.

I wish to express once again my indebtedness to Sir Arthur Keith, who has given me facilities for research and has been ready at all times to give me advice and information derived from his store of knowledge. He pointed out to me the importance of the respiratory movements of the glottis in their bearing on the circulation of the blood, a subject to which he has given considerable attention. I am also extremely grateful to Prof. R. J. S. McDowall, both for allowing me the opportunity of making experimental observations on animals, and also for supplying facts and experimental evidence relating to respiration and circulation.

A large source of knowledge has been supplied by Prof. J. S. Haldane's book on Respiration[2]; so many of the observations recorded are derived from this authority that it would be confusing to refer to each one as it occurs. I have attempted to correlate the various observations and to add my humble contribution to the elucidation of that "sympathetic connexion" described by the great master.

## NORMAL MOVEMENTS OF THE LARYNX.

A study of the anatomical structure of the larynx of all lung-breathing animals is but a means to the understanding of the physiology of the organ. It is only by the evidence of comparative anatomy and physiology that the multifarious functions of this important part of the body can be explained, and I intend to make use of what information is available from the literature and from personal observation in dealing with the question of respiratory movements of the glottis.

The movements of the larynx are many. The whole organ ascends in the neck on deglutition and phonation. The laryngeal aperture closes on swallowing, by virtue of contraction of its muscular sphincter. The vocal cords come together during phonation, and for the alteration of intrapulmonary and intrathoracic pressure in both a positive and negative direction. The ventricular bands come together when it is desired to raise intrathoracic pressure to a great degree. And finally, the vocal cords open and shut to a greater or lesser degree during respiration, in proportion to the force of breathing.

## RESPIRATORY MOVEMENTS AT THE GLOTTIS.

It is recorded in many physiological text-books and in other works that the glottis opens to a certain extent on inspiration and partially closes on expiration; as far as I know, no reason is given for these movements. As they cannot be accidental it seemed necessary to discover their object; brief allusion was made to the subject in my Arris and Gale lecture delivered in 1924.[3] In the present paper it is intended to study the subject more fully, to add whatever new information has been collected, and to apply the physiological findings to the elucidation of certain conditions caused by disease. At the beginning of inspiration the glottis opens to a certain degree, which increases in direct relation to the force of inspiration; at the beginning of expiration it closes partially, and under certain conditions is almost completely closed. Exception may be taken to this statement, because in many individuals in the resting condition the glottis is apparently immobile during the phases of respiration, as pointed out in particular by Semon.[4] In all individuals, however, it seems probable that respiratory movements occur as soon as any exertion is undertaken, while in animals such as cats, dogs, and rabbits, and in birds, reptiles, and amphibians, the opening and closure is to be seen at all times.

In those human beings who do not show variations in size of the glottic aperture during the phases of inspiration and expiration, there is, however, a change in size when an increase or decrease in depth of breathing occurs. This change in size is all that is essential to substantiate the explanation given later on as to the mechanism probably at work. Although alterations in size when present add the fine adjustment to regulation of gas exchanges, it is not necessary that they should occur during the different phases of respiration.

The mechanism is extremely complicated, but without discussing in detail the many factors at work, an attempt will be made to give a short description of the chief objects of the movements as they apply to man.

### *Relation of Respiratory Movements at the Glottis to Alveolar $CO_2$ Content.*

The main function seems to aim at keeping the reaction of the blood constant. This is attained by the provision of a fine adjustment for the regulation of air entry into the lungs, the degree of washing out of $CO_2$ from the alveoli, and the correlation of these actions with the flow of blood through the lungs. A word may be said with regard to gas exchange in the lungs. Atmospheric air contains 20·96 per cent. of oxygen and 0·04 per cent. of $CO_2$. "Alveolar air," obtained at the end of the deepest expiration, is found to contain oxygen 13 per cent., and $CO_2$ 5·6 per cent., and the rest nitrogen.

The venous blood contains about 8 per cent. of $CO_2$; it is not saturated with oxygen. Arterial blood, on the other hand, is saturated with oxygen and contains the same percentage of $CO_2$ as the alveoli—namely, 5·6 per cent. This means that the blood absorbs oxygen and becomes saturated in its passage through the lungs and gives up about 2·4 per cent. of $CO_2$. The latter is removed from the lungs in the tidal air and is dissipated in the atmosphere, where the percentage is so much lower; the greater the volume of $CO_2$ removed from the blood, the greater the volume of tidal air changed per minute.

(*a*) *Mechanism during Inspiration.* — Practical equilibrium is maintained between the $CO_2$ percentage

of the alveolar air and that of the arterial blood; the level in the latter is generally, but not always, slightly higher than that in the former. The percentage both in alveoli and blood changes but little. Haldane states that "a rise of 0·2 per cent. or 1·5 mm. in the $CO_2$ pressure of the alveolar air and arterial blood causes an increase of about 100 per cent. in the resting alveolar ventilation."[2] Any rise of $CO_2$ percentage in the blood would tend to cause a change in the reaction of the blood, but for the action of buffer substances, notably the bicarbonates and phosphates. The $CO_2$ percentage in the arterial blood which leaves the lungs to nourish the tissues is of primary importance, because the tissue cells are intolerant of changes in reaction of the medium which nourishes them, and numerous devices are present to ensure constancy of reaction, which is, in fact, slightly on the alkaline side.

The breathing is regulated to keep the arterial percentage of $CO_2$ constant, and variations are met by alteration of depth rather than of rate; only after big changes is the rate altered.[2] Such alterations will, however, do no more than regulate the average percentages over several respirations. Evidence will be put forward which indicates that glottic movements greatly assist in keeping the interchange of $CO_2$, and hence the blood reaction, practically constant during all phases of respiration.

When inspiration commences the opening of the glottis slightly precedes the moment when expansion of the thorax and descent of the diaphragm commence; there is provided an inlet of a certain calibre in accordance with the immediate needs of the body. In some individuals the size of the glottis is not varied at each respiration, as was pointed out above. The glottis is a choked point on the air-way at all times, even when opened to its maximum extent, and therefore there is always delay in filling of the thorax, even when the force of inspiration is very gentle.

When the capacity of the thorax is enlarged air cannot enter sufficiently quickly to fill the increasing space, and there is consequently a temporary diminution of both intrathoracic and intrapulmonary pressures. When inspiration is gentle the glottis is opened to a slight degree only; the gentle force drawing in air produces a certain degree of negative pressure. When inspiration is powerful the glottis is more widely opened. But a greater volume of air is required to fill the lungs, and although the glottic inlet is wider, yet there will again be negative pressure. And if the force of inspiration be very powerful, the diminution of pressure will be greater than before.

In all cases the results of these actions are much the same; the laryngeal obstruction causes the lungs to be filled gradually instead of suddenly. As breathing is kept automatically at a fixed rate by the control of the respiratory centre, there would be the same number of inspirations every minute, whether the required volume of air entered the lungs gradually or suddenly. The chief reason for the prolongation of air entry appears to be directed to washing out of $CO_2$ from the blood. The gradual entry of air during inspiration leads to gradual dilution of alveolar air, whereby the percentage of $CO_2$ is kept at a more or less constant level in the alveoli, and consequently in the blood. Haldane has shown that, because of the large reservoir of air always present in the lungs, the alveolar $CO_2$ never changes much.[2] Only about one-eighth, or perhaps rather more, of the air-content of the alveoli is changed on gentle respiration; Keith gives the figure as one-fifth.[5] The volume changed at each respiration increases on exertion; therefore the buffer provided by the reservoir of air in maintaining constancy of $CO_2$ is less at such times than during rest.

Even during gentle respiration there must be a content of $CO_2$ in the alveoli gradually tending to rise in percentage from the time when dilution with inspiratory tidal air has reached its maximum point until the next similar phase. It must be remembered that when samples of alveolar air are examined they are invariably taken at the end of the deepest expiration. The sample comes from mixed alveolar air and represents the last part of supplemental air; but it only gives an indication of the percentage of $CO_2$ present in the alveoli at the end of each expiration. If a sample be taken immediately after a forced inspiration results are given differing from what is found by the ordinary method. As the blood leaving the lungs will contain a $CO_2$ percentage almost equal to that in the alveoli, there must be some mechanism by which the percentage is kept constant; otherwise the $CO_2$ in the blood would gradually drop towards the end of inspiration and rise during expiration.

Maintenance of uniformity of $CO_2$ content of the blood seems to be dependent on the volume of blood flowing through the lungs and its relation to the air-content of the alveoli. At the beginning of inspiration the diminished intrathoracic pressure causes more blood to be drawn into the great veins and right auricle; increased intake is aided by descent of the diaphragm, which squeezes blood out of the splanchnic area. At the same time there is diminished pressure in the lungs; this causes dilatation of the pulmonary capillaries because of the lessened air pressure both in the alveoli and on the outer surface of the lungs, as Sharpey Schafer has demonstrated.[6] There is another important factor described by Lewis[7]—namely, diminution of pressure on the pericardium, as distinct from suction action on the great veins and right auricle. The heart's rate is increased among other results; this and the other effects may be shown readily by experiment.

The mean result of these various factors is that more blood is received by the right auricle, and more is pumped through the freely open capillaries. At the beginning of inspiration the air rushing into the alveoli tends to lower the $CO_2$ percentage; at the same time an increasingly large volume of blood rushes through the capillaries, and from it a certain volume of $CO_2$ is washed out. Towards the end of inspiration the dilution of $CO_2$ in the alveoli is at its height, and intrathoracic and intrapulmonary pressures are at the same moment at a lower level than at the beginning of inspiration. Therefore, more blood flows through the lungs and a greater total volume of $CO_2$ is withdrawn. The result is that the $CO_2$ content of the arterial blood leaving the lungs is kept constant.

That a greater volume of blood passes through the lungs during inspiration than during expiration may readily be demonstrated by Valsalva's experiment. If the changes in dilution of alveolar $CO_2$ described did not take place, the blood leaving the lungs during inspiration would contain a higher percentage of $CO_2$ than during expiration; because the alveoli would only be able to take up the same volume of $CO_2$ during inspiration as during expiration. And as a greater volume of $CO_2$ is brought to the lungs by the increased blood-flow during the former phase, there would necessarily be retention during this period.

(*b*) *During Expiration* the pressure inside and outside the lungs is raised, depending to a great extent on the position of the glottis. It is found that during expiration the glottis is narrowed to a considerable degree. As already mentioned, this sudden change in size does not occur in all subjects during quiet respiration. As gentle respiration calls for a partially closed glottis on both inspiration and expiration, the mechanism described above would still hold good.

The increased pressure on the right auricle and great veins does not permit so much blood as before to enter the heart, and the increased pressure on the pulmonary capillaries does not give so free a passage to blood-flow through the lungs as during inspiration. Therefore, the amount of blood flowing through the lungs is less during expiration than during inspiration; the volume gradually decreases from the beginning to the end of the act. As the $CO_2$ content of the alveoli tends to rise during expiration, there will be less washing out from the blood, especially towards the

end of the phase; but as the volume of blood flowing through the lungs is itself diminishing during the same period, so the blood leaving the left heart will contain a more or less constant percentage of $CO_2$.

A gradually decreasing volume of $CO_2$ is washed out of a gradually decreasing volume of blood, and the ratio between the two seems to be maintained by the degree of closure of the glottis. The mechanism is the reverse of that occurring during inspiration.

### *Relation of Respiratory Movements at the Glottis to other Factors.*

What has been described appears to be the chief function of the respiratory movements at the glottis of man, although it is not a primitive function.

(*a*) *Oxygen-content of Alveoli and Blood.*—I had supposed that the mechanism of correlation between air entry and blood-flow was directed towards regulation of oxygen exchange; by Prof. McDowall's aid I was enabled to see the error of this view, and it was at his suggestion that I reconstructed the theory to apply to $CO_2$ exchange. In some aquatic mammals regulation of oxygen-content of the alveoli and blood seems to be a function carried out by the glottis; in man this does not appear to be the case. The percentage of oxygen in the alveolar air even at the end of expiration is almost always high enough to saturate the blood, and from this we see that it is obviously unnecessary for the glottis to take part in regulation of oxygen-content of the lungs.

(*b*) *Relation to Aortic Blood Pressure.*—The respiratory movements have a marked influence on the blood pressure, because of the factors already mentioned—namely, the increased flow of blood through the lungs during the major part of inspiration and the diminished flow during expiration. The normal respiratory waves depend to a considerable extent on the descent of the diaphragm and not merely on the alterations in pressure within the thorax; but the latter factor is the more important of the two. In comparison to the usual high level of aortic blood pressure, however, the respiratory variations would not appear capable of exerting any marked influence; they would seem to be merely incidental to the mechanism designed for regulating the reaction of the blood, and not to be directed purposely to maintenance of the blood pressure in the systemic circulation. It is the power of the left ventricle which maintains the very high pressure in the aorta.

(*c*) *Pump Action on Circulation.*—Sir Arthur Keith has impressed on me the great importance of another closely related factor—namely, the pump action of the respiratory movements in drawing blood through the lungs, and of thus assisting the circulation. The inspiratory pump action has already been described as regards its relation to $CO_2$ exchange, in which respect it appears to be extremely important. As to the assistance given to the heart in causing circulation of blood round the body, the effect is proportional to the difference between the increase of volume of blood drawn into the right heart and great veins and so to the lungs on inspiration, and the decrease of volume consequent on slight compression of the right heart, and especially of the great veins during expiration.

In relation to the work of the heart the glottic movements would seem to exert a definite and important function in conjunction with the other factors such as the mechanical compression of veins and the action of $CO_2$ on the venous reservoirs, which promote the return of blood to the heart and increase the rate and output of the latter. It was stated above that the movements of the glottis have little effect on the height of aortic blood pressure, because the differences noted between inspiration and expiration are slight and almost negligible when compared to the high level present in the great systemic arteries. But as regards the right side of the heart the effect is marked. The pressure in the pulmonary artery is very low as compared with that in the aorta, and any assistance given by the mechanism described during inspiration is of great benefit in maintaining efficient circulation through the lungs. On the other hand, any obstruction offered during expiration exerts a marked influence. These variations, in allowing more or less blood to reach the left ventricle, will indirectly affect the level of aortic blood pressure, but it should be clear that there is a difference as regards the action of the glottis in the two respects—namely, that great assistance is given to the work of the right side of heart, while little is afforded to that of the left.

(*d*) *Effect on Hering-Breuer Reflex.*—When the lung is distended at the end of inspiration a stimulus passes up the vagus which instigates the commencement of expiration. At the end of expiration another stimulus causes inspiration to begin. The obstruction offered by the glottis to passage of air causes prolongation of the time taken to fill or empty the lung and thereby causes suitable delay in the timing of the signals for emptying or filling of the lungs—namely, the Hering-Breuer reflex. The importance of this mechanism has already been emphasised. Lumsden considers that passage of air either into or out of the air passages gives the signal referred to as the Hering-Breuer reflex.[8] Such a view does not alter the significance of the part played by the glottis in the mechanism.

(*e*) *Regulation of Filling of Alveoli.*—From observation of certain facts related to comparative anatomy it appears to me that obstruction offered by the glottis during expiration may have an important effect in assisting to distribute air in the air sac systems, and in helping to fill those alveoli distally situated. The mechanism would be considerably aided by contraction of the bronchiolar musculature at the beginning of expiration, because the bronchioles contract before elasticity of the pulmonary tissue or contraction of the expiratory muscles have had time to expel air from the lungs to any marked extent.

At the same time diffusion of gases from and to tidal air is reinforced by the process of mechanical mixing, probably to a most important degree. It is suggested that air is drawn from the alveoli, air sacs, and alveolar ducts into the bronchioles at the beginning of inspiration; and that at the beginning of expiration some air is driven from the contracting bronchioles into the terminal ramifications of the lungs. The subject is too big to be discussed further at this point; it will be dealt with in a separate paper.

## ALTERATIONS UNDER CERTAIN PATHOLOGICAL CONDITIONS.

### *Reason for Priority of Abductor Paralysis.*

If the recurrent laryngeal nerve be slightly injured, there is loss of power in some of the muscles supplied by it; power disappears from the abductors sooner than from the adductors. This to me is natural, because adduction is an older function than is abduction, and therefore the power of the former survives that of the latter. *Lepidosiren*, a lung fish, has a sphincteric band of muscle at its larynx, which has the power of closing the aperture in the manner of a purse string and of protecting the delicate lungs from the entrance of irritants such as food or water. It has no abductor muscles, according to my observations, and needs none, because passive relaxation of the sphincter is all that is required to allow passage of air into and out of the lungs. In other animals such as *Ceratodus*, another lung fish, dilator fibres are present, so that opening of the glottis can be attained more rapidly and more widely; the sphincteric band is, however, of more primitive origin than are the dilator fibres. In mammals the sphincteric band is split up into various components—namely, the thyro-arytenoid, lateral crico-arytenoid, and inter-arytenoid muscles—while the dilator fibres are represented by the posterior crico-arytenoid. In an animal such as a mongoose the sphincteric group is used mainly for protective closure of the larynx, but not at all for phonation; while the dilator muscles are for opening the glottis on inspiration, just as in *Ceratodus*.

In man and many animals certain fibres of the sphincteric group are used for phonation; this is, however, a comparatively new and subsidiary function, as pointed out in my Arris and Gale lecture, and does not alter the fact that the primary object of the group is for protective closure. Therefore in man, as in lung fish, the function of adduction is of older standing than is that of abduction, and in consequence it survives longest. In cases of abductor paralysis in man the paralysed cord lies nearer to the mid-line than the cadaveric position, because of tonic contraction of the adductor group. In health the position is determined by active contraction of the abductors,[4] balanced by opposition of the adductors, associated with resistance of elastic fibres in the crico-arytenoid joint; the latter tend to bring the cartilages and cords into the cadaveric position.[9]

*Effect of Laryngeal Obstruction.*

Obstruction to passage of air through the larynx may be due either to paralysis of the muscles which open the glottis or to spasm of those which close it, or to local conditions which cause mechanical blockage. If there is merely inability to abduct the vocal cords, then difficulty will be experienced on inspiration only, because of the valvular nature of the glottic margins, which are flat above and conical below. Spasm of the sphincteric muscles will produce effects similar to those of paralytic obstruction; but in the former case the condition is overcome as soon as asphyxia commences, while in the latter it is permanent. As there is nothing particular to describe in the present connexion, spasmodic conditions will not be considered separately. If the pathological process has produced marked narrowing of the laryngeal passage, then obstruction will be offered during both inspiration and expiration. Combinations of the two types of paralytic and mechanical obstruction are met with; they will give rise to mixed effects.

(1) *Inspiratory Obstruction.*—One important result of inspiratory obstruction, usually due to abductor paralysis, will be upset of the normal mechanism of washing out of $CO_2$ from the blood. At the beginning of inspiration in these cases there is considerable delay in the passage of air through the glottis, and therefore there is not dilution of $CO_2$ in the alveoli at the usual rate. But the intrapulmonary and intrathoracic pressures during this phase are lowered more than usual, because the increasing capacity of the lungs is not filled by inrushing air as quickly as is normal. The abnormal lowering of pressure in the thoracic cavity causes an unusually large volume of blood to flow through the lungs as an exaggeration of the usual increase; as the percentage of alveolar $CO_2$ is higher than it should be there is less of the gas washed out of the blood. Consequently the blood leaving the lungs and travelling to the tissues contains a higher percentage of $CO_2$ than in a normal individual during this period; a certain degree of breathlessness is produced because of this relative retention of $CO_2$. Towards the end of inspiration entry of tidal air reaches its maximum and there is therefore dilution of alveolar $CO_2$, so that blood $CO_2$ falls in consequence.

On expiration there is the usual mechanism of washing out of $CO_2$ in cases of abductor paralysis, because, although the failure of the muscles which open the glottis does not permit attainment of the desired width of the aperture, yet the abductors and elastic fibres are still capable of closing it to the requisite degree, while simple relaxation of the sphincteric muscles will allow the funnel-shaped margins to be blown open in a mechanical manner when the force of expiration is great enough to necessitate wider opening at the larynx. Therefore "sympathetic connexion" is not upset during this phase. This is the effect on washing out of $CO_2$ during the different phases of respiration; it is seen that the normal correlation between inspiratory entry of air and volume of blood passing through the lungs is upset, and that the $CO_2$ content of the arterial blood is in consequence no longer constant, tending in the mean result to be higher than usual, and thus causing breathlessness. Other effects are due to the diminution in volume of tidal air because of the abnormal obstruction on inspiration. The $CO_2$ percentage of the arterial blood tends to rise if lung ventilation becomes insufficient. It is raised also because of the abnormally insufficient washing out of $CO_2$ at the beginning of inspiration; a combination of all these factors leads to increased stimulation of the respiratory centre.

The result will be increased effort on inspiration and a temporary compensation of the laryngeal obstruction, and return of blood $CO_2$ to the normal level. The increased effort is not able, however, to keep pace with the accumulation of $CO_2$ in the alveoli; therefore the $CO_2$ in the blood again rises and the respiratory centre has to accommodate itself to respond to a permanent new level. The level may reach as high as 7·5 per cent., as in a case investigated by Dr. R. D. Lawrence and myself.

As to supply of oxygen to the lungs. In the early stages anoxæmia is not produced because of the normal surplus of oxygen contained in the alveolar reservoir; the colour of the patient is therefore good. But as the total volume of tidal air per minute decreases, there will come a time when the hæmoglobin does not find sufficient of the gas to saturate it. A further factor depends on an observation made by Haldane (p. 157).[2] If the blood-flow through the lungs is abnormally accelerated, as it is in these cases during the early stages of inspiration, there may not be time to pick up what oxygen is available; therefore the condition of anoxæmia is aggravated. The effects of anoxæmia on the respiratory centre are to stimulate it in a jerky manner and to hasten an early failure of the controlling mechanism of respiration, which is due chiefly to the continued excessive stimulation by $CO_2$.

(2) *Complete Paralysis.*—Cases of complete paralysis of all the muscles controlling the glottis will show the same characters during inspiration as those already described; during expiration, however, the flabby passive opening of the aperture will not offer sufficient resistance to the current of air. The result will be that the blood-flow during expiration is not decreased to the requisite extent and insufficient $CO_2$ is washed out. Therefore, not only is arterial blood $CO_2$ excessively high at the beginning of inspiration, falling towards the end of the phase, but it also tends to rise above the normal during expiration. The total result is that the respiratory centre is abnormally stimulated and calls for increased effort on the part of the respiratory muscles. The other factors do not differ materially from those seen in abductor paralysis.

(3) *Narrowing of Laryngeal Aperture.*—There will be the same effects during inspiration as those produced in paralytic affections; during expiration, however, there is a difference. Obstruction during the latter phase leads to further decrease in the volume of tidal air per minute; it tends to prolong the Hering-Breuer reflex stimulus for inspiration, but this tendency is counterbalanced by increasing $CO_2$ content in the alveoli—with absolute $CO_2$ retention—and usually by a certain degree of anoxæmia. Therefore the rate of respiration tends to rise, while the force increases. The circulation through the lungs is impeded more than in health, because of the increased pressure brought to bear on the right auricle and great veins and on the pulmonary capillaries. Consequently, sufficient blood for the needs of the body cannot pass through to the left side of the heart during this phase of circulation; the veins become engorged with unoxygenated blood and cyanosis appears at a much earlier stage than in cases of pure inspiratory obstruction.

(4) *Treatment of Laryngeal Obstruction.*—With regard to the treatment of cases of laryngeal obstruction, it must be remembered that prolonged deficiency in lung ventilation and upset in the correlating mechanism between air entry and blood-flow lead to increase in the percentage of alveolar $CO_2$ before signs of anoxæmia appear. Therefore tracheotomy should be performed early and should not be delayed until

urgent symptoms arise. When the condition has become extreme it is often necessary to perform emergency tracheotomy. By this operation lung ventilation is suddenly and enormously increased. Paradoxical as it may seem, even when obstruction has been relieved, there are some cases in which death has taken place, as Sir StClair Thomson has pointed out to me. Therefore it seems necessary to consider the causes and means of avoiding such calamities. In this respect Haldane writes that if the amount of $CO_2$ in the blood and tissues is greatly reduced by effective artificial respiration for some time, there is prolonged apnœa, and the animal dies of want of oxygen without attempting to draw a single breath; he states that this occurrence has been described by Yandell Henderson.[2] The experiment may be carried out personally by deep breathing while resting, when apnœa is produced.

Dale and Evans[10] showed that a certain percentage of $CO_2$ was necessary for efficiency of the vasomotor centre, apart from any question of the action of the respiratory centre; this factor was said to play an important part in the difficulties encountered in the attempt to climb Mount Everest. With regard to the observation of Yandell Henderson mentioned above, Haldane adds: "This important experiment shows that when the $CO_2$ pressure is reduced below a certain point in the respiratory centre, the latter ceases to respond to even the extremest stimulus of want of oxygen."[2] It is apparently the sudden withdrawal of $CO_2$ from the alveolar air and blood, and the consequent inactivity of a respiratory centre temporarily set to respond to a less alkaline blood reaction caused by the high percentage of $CO_2$, that leads to danger in tracheotomy. The problem was elucidated by Prof. McDowall, and in conjunction with him and Dr. R. D. Lawrence I hope to make further investigations of the cause of this occasional unfortunate occurrence, and the means of avoiding danger in such cases. It is sufficient to mention at present that the line of preventive treatment is directed to gradual lowering of the $CO_2$ percentage of the blood, either by injections into the blood itself or by the addition of $CO_2$ to the inspired air.

In the absence of complete data, however, the observations outlined are not intended to represent final conclusions.

*Effect of Tracheotomy and Total Laryngectomy.*

When the regulating mechanism of the glottis is thrown out of action many alterations affect the economy of the individual, and may take the subjective form of depression and an inability for exertion; in some patients the scene is terminated by suicide. Warming the inspired air is not sufficient to combat these ill-effects, and therefore other causes must be sought for. It would be surprising if total abolition of whatever influence is exerted by the respiratory movements of the glottis should be unattended by serious effects, and therefore it will not appear strange if the main factor at work can be traced to removal of the glottic valve from its controlling position. After opening of the trachea the same total volume of air enters and leaves the lungs during each minute if the activities of the body are maintained at the same level as before the operation.

But the lungs are filled more rapidly and emptied more rapidly than before the operation, because the delaying action of the obstructive glottis has been removed from the path of the air-stream. Consequently, the Hering-Breuer reflex is more rapid in onset than before, and rate of breathing appears to be faster than in the healthy individual. The actual rate observed on 274 occasions in 12 subjects of tracheotomy was on the average 22·83. In one patient after the operation —because of double abductor paralysis—the average rate was 27·8, while the average pulse-rate was 68·4. If more respirations are taken each minute, then each one must be shallower than is normal; that is to say, the tidal volume of air at each respiration is diminished.

These alterations in the mode of air entry are of great importance in the question of removal of $CO_2$ from the blood. At the beginning of inspiration in the tracheotomy patients a considerable volume of air enters the lungs suddenly and lowers the percentage of $CO_2$ in the alveoli; consequently, a large volume of $CO_2$ is washed out of the blood during this period. But there has not been the usual fall in pressure within the pulmonary and pleuro-pericardial cavities, because air entry is so free that it can keep pace with the expansion of the thoracic walls, and can fill the increasing space as soon as it is created. There is still, of course, a certain diminution in intrathoracic pressure because of the influence exerted by elasticity of the lungs; but the total effect on blood-flow through the lungs is definitely less than when the glottis is in action. Consequently, the sudden dilution of alveolar $CO_2$ is not associated with any marked increase in the volume of blood flowing through the lungs. As this volume of blood is less than during normal inspiration, and as much $CO_2$ is washed out of it, therefore the $CO_2$ content of the arterial blood will be less at the beginning of inspiration than during health.

Towards the end of inspiration the flow of blood through the lungs increases, but the washing out of $CO_2$ does not increase. As a result the $CO_2$ content of arterial blood rises, and some blood passes through to the systemic circulation insufficiently depleted of the gas.

At the beginning of expiration the tidal air escapes rapidly from the lungs; but there is not the usual increase in intrapulmonary and intrathoracic pressures, because of the absence of obstruction at the glottis. Therefore the blood-stream continues to be of a greater volume than is normal. And as the alveoli have lost their tidal air early, they are gradually accumulating $CO_2$ until the percentage of the gas rises above the usual level. When this happens the percentage of $CO_2$ in the arterial blood must also rise because the one follows the other. As a result the $CO_2$ content of blood leaving the lungs on its way to the tissues continues to rise during expiration; at the beginning of inspiration it will suddenly drop again, as already pointed out.

To sum up: The $CO_2$ percentage in the alveoli falls suddenly at the beginning of inspiration, and rises considerably towards the end of expiration, while the volume of blood flowing through the lungs rises but slightly during inspiration and is decreased to a less degree than is normal during expiration. The result is that the $CO_2$ content of the blood supplied to the tissues is lower than normal at the beginning of inspiration and rises towards the end of inspiration and more so still during expiration. There is relative retention of $CO_2$, which leads to breathlessness, in the same manner as in pneumonia. The changes described will not affect oxygenation of the blood, because the hæmoglobin will be almost saturated, provided there is a sufficient supply of oxygen in the alveolar reservoir.

The supply in the alveoli will be adequate as long as a volume of tidal air arrives at each inspiration sufficient to replace the oxygen which has been taken up by the blood. After opening of the trachea the mechanism will be efficient for this purpose at ordinary times; it is immaterial whether the alveolar oxygen is replaced in jerks instead of in a steady and prolonged stream as in the normal individual. It is possible that upset of distribution of air through the alveoli is another factor dependent on absence of obstruction at the glottis during expiration. Furthermore, the mechanism of air mixing referred to must be obliterated to a certain degree. If contraction of the bronchioles is able to expel air easily through the trachea, there will be an absence of blow-back; replacement of oxygen and removal of $CO_2$ will then depend on diffusion to a greater degree than is usual. As an incident it will be found that the respiratory waves in the aortic blood pressure are distinctly less marked than in the healthy subject; the mean blood pressure need not, however, show any divergence from that usually seen, because of the many factors capable of compensating for the altered mechanism of respiration.

It will be understood, when these disorganisations of a marvellously delicate mechanism are recognised, why certain individuals cannot tolerate life with an open trachea, and prefer the escape of suicide. But there is no reason why the pulmonary air tract should not be fitted with an automatic valve capable of reproducing the movements of the glottis, and of re-establishing "sympathetic connexion" between respiration and circulation; such a valve is in course of construction.

*Results of Nerve Anastomosis.*

The working of the respiratory centre has been elucidated by Lumsden,[8] who describes the normal mechanism as due to periodical rhythmical inhibition of inspiratory tonus. When this inspiratory tonus is inhibited expiration takes place chiefly as a passive act; the latter phase can, however, be actively stimulated from a special centre. Afferent impulses travel up the vagus to the respiratory centre and determine the timing of the phases of respiration. The stimulus for these impulses has been referred to distension or emptying of the lungs, but is thought by Lumsden to be due during easy breathing to passage of air into and out of the lungs.[8] The respiratory centre during the inspiratory period sends stimuli to various muscles, and at the same time it causes the glottis to open because of certain impulses carried by the recurrent laryngeal nerves. The degree of opening of the glottis is determined by the relation of contraction of the dilator group of muscles to that of the sphincteric group. Both sets are in contraction, but during inspiration the action of the abductors is much more powerful than is that of the adductors. The glottis opens before inspiratory movement of the diaphragm commences, and closes before expiration begins, according to observations made on cats by McDowall and myself. Therefore contraction of laryngeal and diaphragmatic muscles is not synchronous.

The factors at work in determining the position of the vocal cords have been described by various authors, notably by Semon.[4] If a stimulus be sent along the recurrent laryngeal nerve as a whole, the glottis closes, because the action of the adductors is more powerful than is that of the abductors. Therefore the stimulus during normal inspiration, which causes the glottis to be held open, must be a selective one, and directed more powerfully to the dilator muscles than to the adductors. After anastomosis of the recurrent nerve in certain paralytic conditions, either to the descendens hypoglossi,[11 12] or to the phrenic,[12] movement of the affected cord may recommence. As there is in these cases a selective stimulus directed to the abductors, it is probable that impulses must originate from different parts of the nucleus of the nerve employed for anastomosis, and stimuli must be supplied to this particular part of the nucleus from the respiratory centre. The phrenic nerve, for instance, must send powerful stimuli to the diaphragm during inspiration, and only feeble ones or none at all during expiration, because this muscle is active only during the former phase, and is passively relaxed during the latter. Therefore it may be supposed that if part of the phrenic be anastomosed to the recurrent laryngeal nerve, and if the nerve were to carry stimuli of the same character as before, there would be impulses sent along all the fibres of the recurrent nerve during inspiration, impulses intended to reach the diaphragm.

It must be remembered that there is no primitive connexion between the larynx and diaphragm. The former is present, and shows definite respiratory movements at the glottis, in many animals in which the latter is absent, as, for instance, in amphibians and reptiles. Any general stimulation would cause closure of the glottis, because of the superior power of the adductors as compared with the abductors. It has been shown that the fibres serving the abductors travel together in a bundle distinct from those going to the adductors[13]; the two groups can be separated in the vagus, and must obviously originate from distinct groups of nerve cells. After anastomosis the abductor fibres must be replaced by a bundle of phrenic fibres in a corresponding position; these must originate from a distinct group of cells. Consequently, it is to be supposed, in view of the fact that abduction of the cords occurs during inspiration, that this new group of cells from which the abductor fibres originate receives a selective stimulus from the respiratory centre, or else that the group supplying the adductors is inhibited, thus allowing tonic impulses to bring about opening of the glottis because of the unopposed action of the abductors.

The results obtained by Ballance and Colledge and others appear to be remarkably successful when these aspects of the subject are considered. But even when this extraordinary selective result has been attained success is not perfect unless the glottic aperture is enlarged to the requisite degree in accordance with the immediate needs of respiration. Wide opening on gentle breathing, or slight opening in forced respiration does not fulfil the conditions necessary for the delicate mechanism described. Although the result is admirable for ordinary purposes and allows of successful respiration and phonation, yet the fine adjustment is lost. If the opening is too big the conditions resemble those described in the case of tracheotomy; while if it is too small then a certain degree of laryngeal obstruction is present, with its varied effects. There is, in brief, a loss of that "sympathetic connexion" referred to by John Hunter, whose brilliant example has supplied the incentive for this attempt at elucidation of certain aspects of a somewhat complex problem.

Research directed to the subject of this paper has been carried out, by permission, in the laboratories of: (1) The Zoological Society of London; (2) the Royal College of Surgeons of England; (3) the Physiological Department, King's College, London; (4) the Throat and Nose Department, King's College Hospital; to the authorities in each case gratitude is expressed. Data relating to the effects of tracheotomy were kindly supplied by the medical superintendent of St. Giles's Hospital, Camberwell, the registrar of the Central London Throat and Ear Hospital, and the surgical registrar of King's College Hospital.

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THE LATE DR. J. F. S. HAY.—Joseph Frank Strong Hay, M.B., C.M. Aberd., Inspector-General of the New Zealand Mental Hospitals, died on Sept. 5th at sea, while returning to New Zealand after a visit to England. Dr. Hay graduated in medicine at Aberdeen University in 1890, and shortly after became assistant medical officer at James Murray's Royal Asylum, Perth, Scotland. He was then appointed to the post of physician-superintendent at the Ashburn Hall Asylum, Dunedin, New Zealand, and subsequently became Inspector-General of Mental Hospitals and Prisons in that country.

# ON IMMUNITY TO THE TOXIN OF STREPTOCOCCUS SCARLATINÆ.

*A Report to the Medical Research Council.*

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AND

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## PART I.

### A MEASUREMENT OF IMMUNITY AS DETERMINED IN CHILDREN AND IN ADULTS BY THE INTRADERMAL TITRATION OF MULTIPLE DOSES OF TOXIN.

AT present there is not available an in-vitro test or an animal test by which the toxin of *Streptococcus scarlatinæ* can be measured, so that for purposes of titration recourse must be had to the skin test on human beings. It may be assumed that a strong Dick toxin will give a positive reaction with the majority of individuals, while the same toxin can be diluted so far that it yields no positive reactors at all. It is only at some intermediate point between these two extremes that a dilution will be found that gives the most successful differentiation between susceptibles and immunes. Theoretically, the best dilution to use is that which gives the greatest number of negative reactions when tested on convalescents, and which, conversely, will also disclose the largest number of positive reactors among susceptible individuals. But to determine this dilution is a problem of much difficulty, nor does it help matters to define it as a dilution of a certain strength, for such a statement gives no measure of its valency. It is a common experience that toxins prepared from the same strain of organism under experimental conditions which seem to be constant give wide variations in potency, so that a 1 in 50 dilution of one toxin may be equivalent to a 1 in 5000 dilution of another.

It follows, therefore, that until such time as the toxins used for a Dick test can be effectively standardised against an antitoxin constant and expressed in terms of this constant, it is premature to group individuals into positive or negative reactors, particularly as it has become customary to base this differentiation on the result of one solitary skin test. Until we have information regarding the effect of both higher and lower dilutions of the same toxin on the same group of individuals, we are unlikely to attain to a true interpretation of our results.

The experiments detailed in this report were undertaken with different dilutions of the same toxin, each individual receiving two, three, or four skin test doses together with a heated control. The toxin used is an 8-volume alcohol precipitated toxin. The smallest amount employed for a skin test dose is represented by 0·00015 mg. of the precipitated product, and from this starting point we have proceeded, by multiples of two, through a series of dilutions to a maximum skin test dose of 16 times the smallest—viz., 0·0024 mg. For descriptive purposes we propose to call the minimum dose one unit, so that the series of experiments we shall describe was undertaken with 1, 2, 4, 8, and 16 units.

Thus it has become possible to grade the individuals who have been tested into what may be termed "immunity groups," and also to determine how much excess of toxin is capable of breaking down resistance in such a way as to transfer a negative reactor into the group of positive reactors.

The most resistant group that comes within the ambit of our observations is composed of individuals who give no reaction with 16 units, while the most sensitive group is made up of individuals who react positively to one unit. The skin reactions of these extreme groups and of the intermediate groups are set forth diagrammatically in Table I.

TABLE I.

The classification of individuals into "immunity groups" according to their reactions to the toxin of *Streptococcus scarlatinæ*.

| Group. | Toxin units. | | | | | Group. | Toxin units. | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 16 | 8 | 4 | 2 | 1 | | 16 | 8 | 4 | 2 | 1 |
| I. .. | − | − | − | − | − | IV. .. | + | + | + | − | − |
| II. .. | + | − | − | − | − | V. .. | + | + | + | + | − |
| III. .. | + | + | − | − | − | VI. .. | + | + | + | + | + |

In our previous report[1] dealing with the preparation and precipitation of the toxin of *Streptococcus scarlatinæ* we divided individuals into positive and negative reactors, taking as positive reactions such as reached a diameter of 1 cm. or more, and classifying as negative all those of lesser extent. It soon became obvious to us, however, that although some slight reactions might be attributable to trauma yet many were actually positive, and therefore could not be legitimately classified as negative. With further experience it became possible for us to distinguish the reaction or disturbance due to trauma from the slightly positive reaction, and this latter we have designated by the symbols ±. The validity of establishing such an intermediate group between positive and negative reactors becomes apparent from a scrutiny of our figures, for with the two- or three-dose method of titration which we have employed it becomes possible to discern how, with increase in dosage, negative reactors are gradually transferred into positive reactors by passage through the intermediate ± zone.

There is also another type of reaction to which we would wish to draw attention. The Dick reaction as it occurs in susceptible folk is of a bright scarlet or pink colour, which to the experienced is unmistakable. In certain scarlet fever convalescents, and occasionally also in individuals who have not suffered from the disease, the reaction may be equal in area to a positive reaction, but it is either colourless or very faintly pink. Its presence may be detected only from the fact that it possesses a well-defined though very narrow pink edging or margin, which may be easily missed unless the examination be carried out in good daylight. From its appearance we would designate this as the "ghost" reaction, and we have classified it with the ± reactions.

### (A) *Titration in Children.*

EXP. 1.—This was carried out with 1 and 2 units and was in the nature of a preliminary titration. Twenty children 14 of whom were from 2 to 5 years and six from 5 to 10 years of age, were tested intradermally. In none of these children as far as could be ascertained was there any history of scarlet fever. At the same time the same amounts of toxin were given to 20 adult females, hospital sisters and nurses, many of whom had had long contact with scarlet fever cases. These groups of individuals were chosen on the assumption that they were likely to represent extremes in so far as immunity to the toxin was concerned. The results, expressed in Table II., showed that although the amounts of toxin used gave good reactions in susceptible children, yet the doses employed did not disclose a single positive reactor among the adults.

TABLE II.

A two-dose experiment to show the differentiation between susceptible children and adult females.

| | Toxin units. | | | | | |
|---|---|---|---|---|---|---|
| | 1 | | | 2 | | |
| | + | ± | − | + | ± | − |
| Children (20) 2–10 years .. | 12 | 2 | 6 | 12 | 4 | 4 |
| Adult females (20) .. .. | 0 | 1 | 19 | 0 | 6 | 14 |

EXP. 2.—In this experiment 2 and 4 units of toxin were used, the test being carried out on 25 non-scarlet children

[1] Henry, H., Lewis, F. C., and Others: On the Toxin of *Streptococcus scarlatinæ*, THE LANCET, April 4th, 1925, p. 710.

and on 50 children convalescent from scarlet fever. The age-groups of these children were as follows:—

| Years— | 2–5 | 5–10 | 10–15 |
|---|---|---|---|
| Non-scarlet | 20 | 5 | — |
| Scarlet | 13 | 27 | 10 |

The scarlet children were grouped according to their period of convalescence thus:—

| Days— | 0–10 | 10–20 | 20–30 | 30 |
|---|---|---|---|---|
| Scarlet | 0 | 3 | 7 | 40 |

The results (Table III.) show that with 2 units there is a marked preponderance of positive reactors among non-scarlet children and that the majority of scarlet convalescent children are resistant to the same dose.

## TABLE III.

A two-dose experiment in selected children to show differentiation of normal from scarlet fever convalescent children.

| | Toxin units. | | | | | |
|---|---|---|---|---|---|---|
| | 2 | | | 4 | | |
| Children. | + | ± | − | + | ± | − |
| Non-scarlet (25) | 16 | 6 | 3 | 20 | 3 | 2 |
| Scarlet (50) | 2 | 7 | 41 | 10 | 12 | 28 |

EXP. 3.—This was a three-dose titration carried out with 2, 4, and 8 units on 100 scarlet fever convalescents and on 100 non-scarlet individuals. Each series shows approximately 10 per cent. of adults, the remainder being children who, when classified according to their age, present two groups that are as closely parallel as is practically possible. The age-groups of both series and the period of convalescence in the case of scarlet fever individuals are as follows:—

| Age-groups— | 2–5 | 5–10 | 10–15 | Adult |
|---|---|---|---|---|
| Non-scarlet (100) | 40 | 32 | 19 | 9 |
| Scarlet (100) | 25 | 45 | 19 | 11 |

| Convalescence in days— | 0–10 | 10–20 | 20–30 | 30 on |
|---|---|---|---|---|
| Scarlet | 5 | 22 | 24 | 49 |

The readings of this titration are set out in Table IV.

## TABLE IV.

A three-dose experiment to show differentiation between non-scarlet children and scarlet fever convalescent children, as representing an average fever hospital population.

| | Toxin units. | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2 | | | 4 | | | 8 | | |
| | + | ± | − | + | ± | − | + | ± | − |
| Non-scarlet (100) | 53 | 7 | 40 | 55 | 13 | 32 | 64 | 19 | 17 |
| Scarlet (100) | 9 | 11 | 80 | 17 | 11 | 72 | 25 | 22 | 53 |

EXP. 4. *A Collection of "Throw-outs."*—In Exps. 2 and 3 we have dealt with two well-defined series of individuals. One of these series was made up of individuals who had passed through an attack of scarlet fever, while the other series comprised those who had passed through an attack of diphtheria. From the first series we have been careful to exclude those cases in which there was, on clinical grounds, doubt in regard to the diagnosis of scarlet fever and these we have grouped under the term "doubtful diagnosis." At the same time, there were found in the diphtheria wards a number of children in which there was a clear history of a previous attack of scarlet fever. These we have excluded from the non-scarlet cases and classified here as "old scarlets." The age-groups of these individuals are as follows:—

| Age-groups— | 2–5 | 5–10 | 10–15 | Adult |
|---|---|---|---|---|
| Doubtful diagnosis (23) | 3 | 12 | 5 | 3 |
| Old scarlets (22) | 2 | 14 | 5 | — |

The three-dose titration of these groups is given in Table V.

## TABLE V.

A three-dose experiment in cases of doubtful diagnosis and in cases in which there is definite evidence of a previous attack of scarlet fever.

| | Toxin units. | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2 | | | 4 | | | 8 | | |
| | + | ± | − | + | ± | − | + | ± | − |
| Doubtful diagnosis (23) | 10 | 4 | 9 | 16 | 3 | 4 | 18 | 2 | 3 |
| Old scarlets (22) | 1 | 0 | 21 | 1 | 0 | 21 | 2 | 5 | 15 |

EXP. 5. *Determination of End-points in the Scale of Titration.*—The figures which result from the titrations grouped together in Exp. 3 show the number of positive and negative reactions to 2, 4, and 8 units of toxin in two series of individuals, composed respectively of scarlet and of non-scarlet children of comparable age. There still remains for determination the number of positive reactors at the extreme limits of our scale—viz., with 1 unit and with 16 units. Ten scarlet fever convalescents who proved to be negative to 8 units were tested intradermally with 16 units, and of these five proved to be positive. No similar figures are available for non-scarlet children, but it may be assumed that in this case the number of positive reactors to 16 units is as before—viz., about half the number that is negative to 8 units. The 16-unit results are not easy to read, because here for the first time we found ourselves faced with the difficulty of pseudo-reactions. At the other end of the scale—viz., in experiments with 1 unit—it was found that out of 24 non-scarlet children who were positive to 2 units, 13 proved to be still positive to 1 unit. No figures are available in respect of scarlet convalescents, and here again we have assumed the number of positive reactors to 1 unit to be approximately half the number of those who are positive to 2 units. At this end of the scale also it is difficult to arrive at an accurate estimate, because the reactions are both slight in intensity and fugitive in character.

### (B) *Titration in Adults.*

EXP. 6.—A three-dose test with 2, 4, and 8 units was carried out on 120 adult females and on 110 adult males, the result of the titration being set forth in Table VI. Of ten adult females who were resistant to the 8-unit dose, five proved to be still resistant to 16 units. In the case of the adult males no figures are available. Also, at the other end of the scale, in regard to the 1-unit dose no figures are available either in respect of adult males or of adult females. A reference to the graph shows that immunity is at a higher level in the females we tested than in the males.

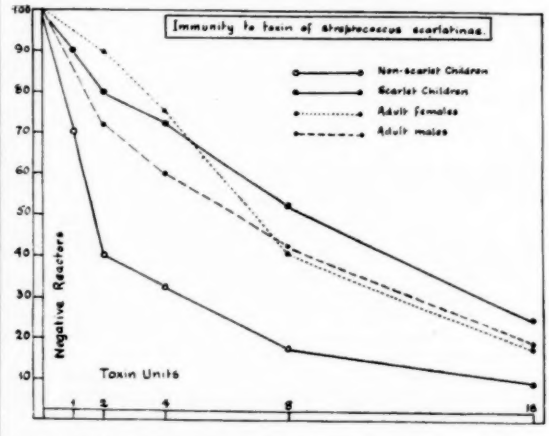
## TABLE VI.

A three-dose titration in adults.

| | Toxin units. | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2 | | | 4 | | | 8 | | |
| | + | ± | − | + | ± | − | + | ± | − |
| Adult females (120) | 4 | 9 | 107 | 12 | 16 | 92 | 45 | 25 | 50 |
| Adult males (110) | 25 | 5 | 80 | 31 | 12 | 67 | 40 | 23 | 47 |

### *Discussion.*

Exps. 1 and 2 were undertaken with a view to determining how effective our toxin is in disclosing a differentiation between susceptibles and immunes. In each case there was a selection of individuals




that resulted in an accentuation of this capacity for differentiation. The susceptible individuals were the most susceptible that could be found, and the resistant individuals were, on similar presumptive grounds, those whom we decided were likely to show the highest immunity. Therefore the differentiation between susceptible and resistant people is in each of these experiments at an exaggerated maximum.

On the other hand, the individuals grouped in Exp. 3 were not selected, and so represent better an average hospital population. From the figures obtained in Exp. 3 we have constructed a graph showing the degree of immunity of both scarlet and non-scarlet children at each point on our scale of titration. It is to be noted that the maximum amount of differentiation according to our experimental data is not at one particular point of the scale, but extends over a relatively large range of doses. With 2, 4

and 8 units it is practically 40, and it is perhaps of interest to note that the maximum percentage differentiation as given by the Dicks for one skin test dose is 41·6.

On reference to the theoretical definition of a skin test dose as propounded in the introduction to this Report it will be found that the 2 unit dose agrees more closely with this definition than any other, inasmuch as it gives the minimal number of positive reactors in scarlet fever convalescents. Yet the American skin test dose differs from our 2 unit dose in one very important particular, in that it discloses only negative or faintly positive reactors among scarlet fever convalescents, whereas the 2 unit dose gives positive reactions in 20 per cent. of convalescents. Most of these reactions are strongly positive, so that a difference of interpretation of readings does not account for the existence of this difference between our findings and those of American workers.

In seeking to discover what these positive reactors mean we would venture to suggest that the following considerations might be borne in mind. 1. They may be cases of mistaken diagnosis, a possibility which cannot be excluded. 2. They may be cases of scarlet fever which do not for some reason develop an immunity. It is to be noted that more than half these cases suffer from complications such as otitis, myocarditis, &c. 3. They may be cases which resemble scarlet fever so closely as to be clinically indistinguishable from it, in much the same way that paratyphoid resembles typhoid. In the present state of our information it is not possible to assign to each of these three considerations its proper measure of importance. We think it probable that no one of them can be altogether excluded.

There still remains to consider the question of the degree of immunity as shown by adults and by scarlet fever convalescents. To the graph which interprets Exp. 3 we have added our findings in regard to adult immunity. The majority of the females were hospital staff who were constantly coming into contact with scarlet fever, while the adult males were taken at random. Yet, except for an increased immunity in the females, there is but little difference between the two curves. Also we find that the level of immunity to which adults reach is practically the same as that attained by convalescent children. Of the males only 9 per cent. and of the females 20 per cent. gave a previous history of scarlet fever, so that the majority of the adults, both female and male, have acquired immunity without passing through a disease which is clinically recognisable as scarlet fever. Also, at first sight the degree of immunity reached by convalescent children would seem to be relatively low. Is this because the type of scarlet fever is at present mild in character, or is it because the peak of antitoxin production is reached only after months rather than weeks of convalescence?

## PART II.

### AN EXPRESSION OF INDIVIDUAL RESISTANCE IN TERMS OF ANTITOXIN CONTENT.

In the first part of this Report we have sought to classify individuals into a series of "immunity groups" according to their resistance to increasing doses of the toxin of *Streptococcus scarlatinæ*. Our findings showed that throughout any collection of individuals the resistance varied over a wide range. At one end of the scale of immunity could be grouped the majority of small children in that they proved to be sensitive to a small dose of toxin, whereas the bulk of convalescent scarlet fever children and the majority of adults either male or female were resistant to this dose. Further, by testing with multiples of this small dose it became possible to obtain a collection of folk who were highly resistant to the toxin in that they did not react to these higher doses.

It remained, however, to discover whether this resistance, as determined by a skin test, could be measured in any other way. The brief series of experiments detailed in this report shows that individual resistance to the skin test is correlated with the presence of antitoxin in the blood of the individual. The sera which have been proved to contain antitoxin were taken from individuals in Groups I. and II. of the "immunity groups" already mentioned. At the same time we have examined serum obtained from individuals in Groups V. and VI., and in these we have not detected any antitoxin which is measurable by the titration method employed.

#### *Method of Titration.*

The method has consisted in the mixing of a fixed amount of toxin with decreasing amounts of serum, the mixtures being incubated for one hour at 38° C. before inoculation. For example, if 50 units of toxin in 0·5 c.cm. of saline are mixed with 0·5 c.cm. of undiluted serum, and if 0·2 c.cm. of the mixture be used for the skin test, then the inoculum consists of 10 units of toxin and 0·1 c.cm. of serum.

For the testing of toxin-antitoxin mixtures individuals who are susceptible to 1 or 2 units have to be selected, because they react the most readily to any unneutralised toxin there may be in the mixture and so give a more exact end-point. The amount of toxin used in each individual dose of a toxin-antitoxin mixture is a matter for experiment. We have found that 4 units gives an end-point that is too indistinct, and that 20 units gives an end-point which occurs too suddenly, and which may occasion too large an area of skin reaction. A dose of 10 units has been selected, therefore, as being a practicable amount.

#### *Interpretation of Readings.*

The fact that these toxin-antitoxin mixtures are capable of dissociation after inoculation presents a problem which may add considerable difficulty in regard to the reading of an end-point. The phenomenon may be best explained perhaps by the description of an actual example. A human serum containing antitoxin was titrated against 10 units of toxin, the amounts of serum present in each skin test dose of the series being 0·1, 0·04, 0·02, 0·01, 0·004, 0·002, 0·001, 0·0004 c.cm. The reactions in the case of the first three doses were 0·25 to 0·5 cm. in diameter at 24 hours, and at 48 hours were faint and indistinct. In the case of the next three doses in the series the 24-hour readings gave areas of varying size from 1 to 2 cm. in diameter, whereas at 48 hours each of these areas had greatly increased by the formation of an areola, the total zone of skin affected being 3 cm. or more in diameter. In the case of the last two doses the reactions, of 2 to 3 cm. in diameter, were fully developed at 24 hours and had begun to fade at 48 hours. There are thus three zones of reactions to be read after the intradermal titration of a toxin-antitoxin mixture—a zone of complete neutralisation, a zone of dissociation and presumably of partial neutralisation, and a zone of no apparent dissociation with neutralisation at a minimum.

The problem of dissociation is not one that can be dealt with here, and we propose to discuss it more fully in a future Report, particularly as it has a distinctly practical bearing on the immunisation of individuals with toxin-antitoxin mixtures.

The end-point in the scale of titration which we have selected is the point at which occurs a reaction of 1 cm. or less in 24 hours. Each serum dealt with in this Report has been titrated on two or more individuals, the value given in each instance being the number of toxin units neutralised by 1·0 c.cm. of serum.

EXP. 7.—This was carried out with four sera taken from individuals who were strongly sensitive to toxin: Serum A, adult female, sensitive to 1 unit, giving no history of scarlet fever; B, child, aged 5 years, sensitive to 2 units, having no history of scarlet fever; C, child, aged 5 years, "doubtful diagnosis," sensitive to 2 units; D, adult female, aged 19 years, diagnosed as surgical scarlet fever, highly sensitive to 2 units. The results, set forth in Table VII., show that there is no neutralisation of 10 units of toxin even with 0·1 c.cm. of serum, and that if antitoxin is present it cannot be measured in the scale of titration used. The absence of dissociation in the case of serum A we are inclined to

consider as indicating complete, or almost complete, absence of antitoxin, while its presence in sera B, C, and D indicates small quantities of antitoxin. Each of these sera, therefore, contains less than 100 units.

TABLE VII.

Four sera taken from individuals who are sensitive to small doses of toxin and titrated against 10 units of toxin. In all cases the reactions were more than 1 c.cm. in diameter.

| Serum. | Test. | Serum—amounts in c.cm. | | | Serum. | Test. | Serum—amounts in c.cm. | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 0·01 | 0·04 | 0·02 | | | 0·01 | 0·04 | 0·02 |
| A | 1 | + | + | + | C | 1 | + | + | + |
| | 2 | + | + | + | | 2 | + | + | + |
| | 3 | + | + | + | | | | | |
| B | 1 | + | + | + | D | 1 | + | + | + |
| | 2 | + | + | + | | 2 | + | + | + |
| | 3 | + | + | + | | | | | |

EXP. 8.—Two sera taken from Group I. individuals and two taken from Group II. individuals were used in this experiment: Serum A, adult female with history of scarlet fever in infancy; B, a convalescent scarlet fever child; C and D, adult female with no history of scarlet fever. The results, set out in Table VIII., show that each of these sera contains a measurable amount of antitoxin. In the case of the Group I. sera it amounts to 500 units, while in the others it amounts to about 400 and 250 units respectively.

TABLE VIII.

Four sera taken from resistant individuals and titrated against 10 units of toxin.

| Serum. | Test. | Serum—amounts in c.cm. | | | | | Serum. | Test. | Serum—amounts in c.cm. | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0·1 | 0·04 | 0·02 | 0·01 | 0·004 | | | 0·1 | 0·04 | 0·02 | 0·01 | 0·004 |
| A | 1 | − | − | − | + | + | C | 1 | − | − | − | + | + |
| | 2 | − | − | − | + | + | | 2 | − | − | + | + | + |
| | 3 | − | − | − | + | + | | 3 | − | − | − | + | + |
| | 4 | | | | − | | | | | | | | |
| | 5 | | | | + | | | | | | | | |
| | 6 | | | | − | | | | | | | | |
| B | 1 | − | − | − | + | + | D | 1 | − | − | + | | |
| | 2 | − | − | − | + | + | | 2 | − | − | − | | |
| | | | | | | | | 3 | − | − | + | | |

*Summary.*

The sera of individuals who are sensitive to small doses of toxin contain little or no antitoxin. On the other hand, the sera of resistant individuals contain a measurable quantity of antitoxin, amounting to as much as 500 units. That this amount is considerable may be judged from the fact that the best of a series of horse antitoxic sera, the first to be produced in this country, titrated against 20 units of toxin, have given a unitage of about 800 on the same scale. The exact relationship of resistance to antitoxin content is a matter for further experiment.

There are peculiar difficulties which are inherent to an investigation of this nature. Fortunately we have had the encouraging help of the public health committee of the Birmingham City Council, and it gives us pleasure to record our appreciation of the facilities they have given us in affording access to clinical material in the City Fever Hospitals and of the practical and friendly interest they have taken in the progress of the work. The majority of the reactions herein detailed were carried out by ourselves, and for most of the remainder we have to thank Dr. E. H. R. Harries and his medical officers. We gladly express our thanks, too, to Dr. R. H. H. Jolly and Dr. B. C. Haller, of Wolverhampton, together with Dr. J. B. Ferguson and Dr. R. Sandilands, of Smethwick, who generously placed at our disposal the available material in the respective hospitals over which they have control. We also wish to thank the President and members of the Birmingham Rotary Club for assisting us in obtaining the necessary number of adult volunteers for test.

# THE GEOGRAPHICAL DISTRIBUTION OF HEART DISEASE IN ENGLAND AND WALES

## AND ITS RELATION TO THAT OF ACUTE RHEUMATISM AND TO SOME OTHER FACTORS.

BY MATTHEW YOUNG, M.D. GLASG.

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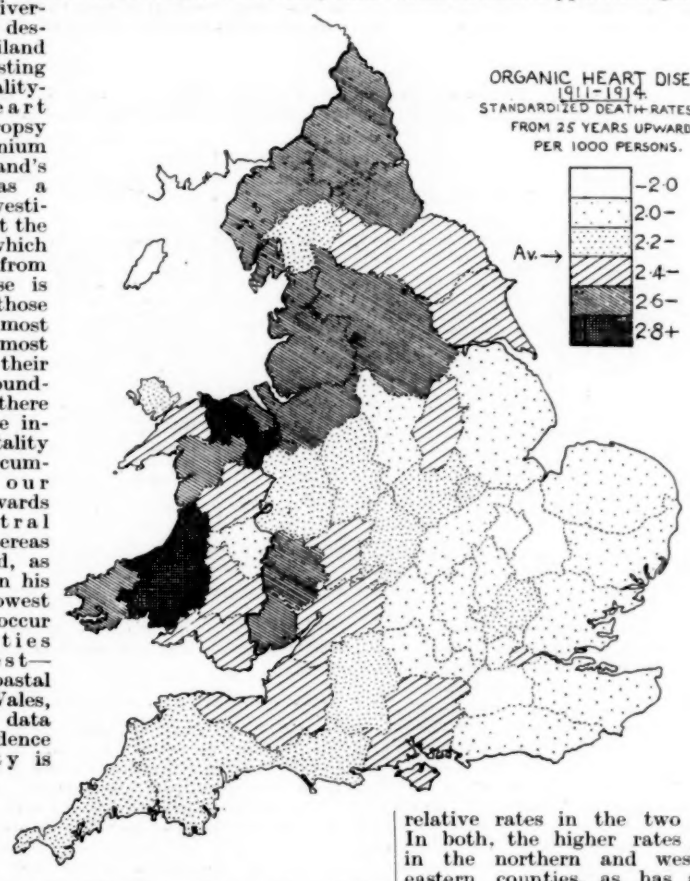
THE annual mortality from heart disease in England and Wales comprises a relatively large proportion, approximately 12 per cent. on the average, of the mortality from all causes. It seemed to be of interest to determine from recent data if the mortality from this cause showed any notable variation in different parts of the country, if the districts with high and low rates of mortality were distributed in any special manner, and if the geographical distribution of heart disease had any relationship to that of acute rheumatism which so frequently precedes it, or any association with special physical features, or industrial or environmental conditions.

The data that were used were the recorded deaths, at the different ages, from heart disease in the administrative counties and county boroughs of England and Wales published by the Registrar-General in his annual reports. Two groups of data were taken: (1) The deaths from organic heart disease in the four years' period 1911–14, and (2) the deaths from heart diseases in the three years' period 1921–23. Included in the term "organic heart disease," as defined by the Registrar-General, are valvular disease of the heart, fatty degeneration of the heart, and other organic diseases of the heart. The data for the three years' period consist of heart diseases in the aggregate and include, in addition to organic heart disease, pericarditis, acute endocarditis, acute myocarditis, and angina pectoris. These other diseases only comprise, however, as shown by the data for the three years' period 1921–23, approximately 6·5 per cent., and, excluding angina pectoris, 4 per cent. of the total deaths from heart disease on the average. Amongst the recorded deaths from heart disease in the same triennial period, 44 per cent. are described definitely as valvular disease, a further 20 per cent. are given as "heart disease undefined," which is probably also to some extent valvular disease; well over 50 per cent. of the registered mortality from heart disease may thus probably be attributed to valvular affections.

From the published data for deaths from heart disease in urban and rural districts in the administrative counties and the associated county boroughs, figures were compiled for the areas corresponding approximately, but not accurately, to registration counties, and for each of these standardised death-rates from heart disease for the sexes separately, and for persons from 25 years of age and upwards and from 45 years and upwards respectively were calculated. These standardised death-rates for the different areas, which may be referred to briefly as county areas, were used as an index of the mortality therein. In England and Wales data were available for 55 counties altogether.

The standardised death-rates from heart disease amongst persons from age 25 and upwards were inserted in a map of England and Wales (see figure) showing the counties, and the distribution of the rates obtained from the data for the two periods, 1911–14 and 1921–23, was in general very similar and very characteristic. The death-rates for the earlier period are shown in Table I., and the distribution of these rates, classified in six different grades of magnitude, is shown in the accompanying map. The highest rates, with few exceptions, are found localised in the northern and western areas of the country; in the counties of Wales particularly, the rates are generally above the average for England and Wales as a whole. The

counties of Radnor and Westmorland are notable amongst the exceptions to this generalisation. The rate in Westmorland, however, is practically the average for the whole country, and in the later period it exceeds the average. It should be recollected also that in both these counties the number of deaths and the total population are relatively small, and consequently the death-rates have a larger probable error than in many of the other counties. In the eastern, south-eastern, and midland counties of England, however, the mortality-rates are lower than in the counties farther west, and definitely below the average as a rule. The incidence of the relative mortality thus shown is very divergent from that described by Haviland (1875) as existing for the mortality-rates for heart disease and dropsy in the decennium 1851–60. Haviland's conclusion, as a result of his investigation, was that the counties in which the mortality from heart disease is greatest are those that are the most inland or the most protected by their physical surroundings, and that there is a progressive increase of mortality from the circumference of our peninsula towards its more central localities. Whereas Haviland found, as he illustrates in his maps, the lowest mortality to occur in the counties farthest west—namely, the coastal counties of Wales, in the present data the highest incidence of mortality is localised there. The discrepancy may be explained in part by Haviland's use of crude mortality rates for the earlier period, but the distribution of relative mortality in the two periods, 1851–60 and 1911–14, is so completely at variance that it seems unlikely that this can be an adequate explanation. Possibly some change in the relative incidence in different districts may have taken place in the interval that has elapsed between the two epochs. It is readily apparent from the map that the lowest mortality in the present data is not coincident with or closely related to the greatest exposure to prevailing winds or sea air, or the highest mortality characteristic of districts that are protected by their physical features, as suggested by Haviland, and that other factors that determine the distribution must be in operation.




*Association between Relative Mortalities from Heart Disease and Acute Rheumatism.*

The question then arises, is there any correspondence in the county areas between the distribution of the relative mortalities from heart disease and acute rheumatism? In a previous paper (1921) on the epidemiology of rheumatic fever, the distribution of the mortality from rheumatic fever in the registration counties of England and Wales, as shown by the standardised death-rates from age 15 upwards, is given for the decennium 1901–10. This analysis seemed to show that an excessive incidence of the disease in the counties had some definite relation to excessive amounts of rainfall and cold weather. Though the standardised death-rate from rheumatic fever can only be regarded as an approximate measure of the actual incidence of the disease in the respective counties, it is the only criterion that is available at present. The use of the mortality-rates as an index of the prevalence of the disease in different districts receives some support as regards the northern, western, and eastern counties of England from some data recently published in an analysis of the incidence of rheumatic fever amongst insured persons in England and Wales in 1922 by the Rheumatism Committee of the Ministry of Health. An excess of acute, including subacute, rheumatism over what might be expected was found in the north-western and north-eastern divisions, whereas the south-eastern division showed a pronounced shortage as compared with what might be expected.

On comparing the two maps of England and Wales that had been prepared to show the mortality-rates from rheumatic fever and from heart disease in the respective counties, evidence of some agreement in the distribution of the relative rates in the two diseases was apparent. In both, the higher rates were found in general in the northern and western counties; in the eastern counties, as has already been mentioned for heart disease, the rates were considerably lower. The data available made it possible to determine the relationship more precisely. Coefficients of correlation were calculated between the standardised death-rates from rheumatic fever amongst persons aged 15 and upwards in the respective counties in the decennium 1901–10 and the standardised death-rates from organic disease of the heart in the corresponding counties for each of the periods 1911–14 and 1921–23. In the earlier period, the coefficient of correlation between the death-rate from heart disease at age 25 and upwards and acute rheumatism was $+ \cdot 590 \pm \cdot 059$ and that between the death-rate from heart disease at age 45 and upwards and acute rheumatism $+ \cdot 573 \pm \cdot 061$. For the later period the coefficients of correlation between the corresponding variables were $\cdot 608 \pm \cdot 057$ at age 25 and upwards and $+ \cdot 563 \pm \cdot 063$ at age 45 and upwards—i.e., practically identical with those for the earlier period. A very definite association thus exists in the counties between the distribution of the relative mortalities from rheumatic fever and diseases of the heart in the aggregate.

### *The Industrial Factor.*

With regard to the distribution of relative mortality from heart disease throughout England and Wales, certain other points require consideration. Amongst the English counties showing the highest mortality-rates from heart disease are the West Riding of Yorkshire, Durham, Northumberland, and Lancashire. These counties possess the common feature that one or two special industries provide occupation for a relatively large proportion of their inhabitants. Thus, in the West Riding, textile, principally wool and worsted, manufacture and coal-mining; in Lancashire textile, principally cotton, manufacture, coal-mining, and working in metals; in Durham and Northumberland, coal-mining, are much the commonest forms of employment for males. It may be suggested that the excessive mortality from heart disease found in these counties has some relationship to the special industries that prevail therein. The influence of occupation in determining the onset of heart strain and valvular disease of the heart has been described by some authors, including Peacock (1865) and Cowan (1922). Fortunately it is possible to obtain some information on this point. In the supplement to the seventy-fifth annual report of the Registrar-General, Part IV., are given particulars of the mortality from valvular disease of the heart in certain occupations in the three years 1910, 1911, and 1912. The comparative mortality figure for valvular disease of the heart for all occupied and retired males in the three years' data is 39. In textile workers as a whole and in those engaged in cotton manufacture, in wool and worsted and in hosiery manufacture, the mortality figures for the disease are practically the average for all males. In the coal-mining industry as a whole the comparative mortality figure for valvular disease of the heart is 37; in coal-miners in Lancashire and in Northumberland and Durham it remains at the same level—i.e., approximately the average for all occupations. In the groups of metal workers the comparative mortality figure for the disease is usually under the mean value. The mortality-rates for valvular disease thus do not seem to be in excess in the occupations which provide the major proportion of the employment in these counties. Further, as has been mentioned already, many counties with relatively high death-rates from heart disease as a whole, including those actually highest, are found in Wales. In Brecknock, Carmarthen, Denbigh, and Glamorgan a relatively large proportion of the male population is employed in the mining industry, but in Cardiganshire and Pembrokeshire, where rates amongst the highest that occur are found, the population is mainly engaged in agricultural pursuits; in Merionethshire also, agriculture provides employment for the largest proportion of the male inhabitants, though many are engaged in slate-mining and quarrying. In slate-quarriers and workers the comparative mortality figure for valvular disease of the heart is 37—i.e., practically the average; in agricultural workers and farmers the comparative mortality figures are definitely lower than the average for all occupied males. The circumstance that the highest death-rates from heart disease occur in counties in Wales where no specially adverse industrial conditions exist, such as obtain in the West Riding of Yorkshire and Lancashire, is opposed to the view that the excessive prevalence of the disease in the latter can be attributed in any definite degree to occupational influences.

TABLE SHOWING THE STANDARDISED DEATH-RATES FROM ORGANIC DISEASE OF THE HEART IN THE COUNTY AREAS OF ENGLAND AND WALES FOR THE FOUR YEARS' PERIOD 1911–14.

| Counties. | S.D.R.'s per 1000 from age 25 upwards* | | | Counties. | S.D.R.'s per 1000 from age 25 upwards* | | | Counties. | S.D.R.'s per 1000 from age 25 upwards* | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | M. | F. | P. | | M. | F. | P. | | M. | F. | P. |
| Bedford | 2·129 | 2·129 | 2·129 | Leicester | 2·252 | 2·332 | 2·342 | Worcester | 2·638 | 2·339 | 2·488 |
| Berkshire | 2·295 | 2·077 | 2·181 | Lincoln | 2·204 | 1·859 | 2·032 | York, E. Riding | 2·684 | 2·198 | 2·441 |
| Buckingham | 2·219 | 1·904 | 2·062 | Middlesex | 2·261 | 1·992 | 2·127 | York, N. Riding | 2·577 | 2·527 | 2·552 |
| Cambridge | 1·839 | 1·749 | 1·794 | Monmouth | 2·503 | 2·731 | 2·617 | York, W. Riding | 2·727 | 2·763 | 2·745 |
| Chester | 2·803 | 2·563 | 2·683 | Norfolk | 2·185 | 1·926 | 2·056 | Anglesey | 2·423 | 2·171 | 2·297 |
| Cornwall | 2·477 | 2·171 | 2·324 | Northampton | 2·100 | 2·011 | 2·056 | Brecknock | 2·401 | 2·602 | 2·502 |
| Cumberland | 2·844 | 2·444 | 2·644 | Northumberland | 2·718 | 2·663 | 2·691 | Cardigan | 2·901 | 2·786 | 2·844 |
| Derby | 2·106 | 2·273 | 2·190 | Nottingham | 2·616 | 2·528 | 2·572 | Carmarthen | 2·583 | 3·151 | 2·867 |
| Devon | 2·451 | 2·141 | 2·296 | Oxford | 2·200 | 2·089 | 2·145 | Carnarvon | 2·674 | 2·374 | 2·524 |
| Dorset | 2·313 | 2·133 | 2·223 | Rutland | 2·452 | 2·251 | 2·352 | Denbigh | 2·666 | 3·128 | 2·897 |
| Durham | 2·717 | 2·675 | 2·696 | Shropshire | 2·470 | 2·261 | 2·366 | Flint | 2·646 | 2·551 | 2·599 |
| Essex | 2·172 | 2·042 | 2·107 | Somerset | 2·990 | 2·150 | 2·570 | Glamorgan | 2·621 | 2·562 | 2·592 |
| Gloucester | 2·709 | 2·336 | 2·523 | Stafford | 2·263 | 2·252 | 2·258 | Merioneth | 2·914 | 2·319 | 2·617 |
| Hampshire | 2·635 | 2·213 | 2·424 | Suffolk | 2·092 | 2·063 | 2·078 | Montgomery | 2·353 | 2·542 | 2·448 |
| Hereford | 2·696 | 2·623 | 2·660 | Sussex | 2·336 | 2·020 | 2·178 | Pembroke | 2·756 | 2·775 | 2·766 |
| Hertford | 2·414 | 1·978 | 2·196 | Surrey | 2·027 | 1·708 | 1·868 | Radnor | 1·897 | 2·228 | 2·063 |
| Huntingdon | 1·786 | 1·904 | 1·845 | Warwick | 2·148 | 2·286 | 2·217 | London | 2·507 | 2·344 | 2·426 |
| Kent | 2·211 | 2·058 | 2·135 | Westmorland | 2·529 | 2·228 | 2·379 | | | | |
| Lancaster | 2·632 | 2·574 | 2·603 | Wiltshire | 2·354 | 2·323 | 2·339 | England and Wales | 2·479 | 2·351 | 2·415 |

* The deaths from age 25 upwards exceed 95 per cent. of the total deaths.
M. = Males. F. = Females. P. = Persons.

### *Incidence of Heart Disease in the County Boroughs.*

Some reference may be made to the incidence of heart disease in the county boroughs. As the deaths at the different ages in the several county boroughs had been extracted for the purpose of summation with those in the administrative counties with which they are associated, and as the corresponding populations were readily obtained, the standardised death-rates from age 25 and upwards were calculated for each borough. The standardised death-rate from organic heart disease amongst persons in all the county boroughs taken together exceeds that for England and Wales as a whole by 9·5 per cent. and that for the rural districts of England and Wales by nearly 18 per cent. Dr. J. Brownlee (1922) has shown, however, that the apparent excess in mortality from valvular heart disease in town over country practically disappears when the life table death-rate is used as the criterion. In the data for the four years' period 1911–14 (see table) the standardised death-rates from heart disease in the different county boroughs show a considerable range of variation. The highest values are found in Bury, South Shields, Oldham, West Hartlepool, Chester, Rochdale, and Worcester. Though these include some of the chief industrial county boroughs of Lancashire, Durham, and the West Riding of Yorkshire, and though other industrial boroughs of these counties show relatively high values, certain other boroughs therein—e.g., Sheffield, Wigan, and Bolton, in which industrial activity is apparently quite as intensive as in those already named—have relatively low mortalities from heart disease. Moreover, the cities of Chester and Worcester

are two boroughs in which the mortality-rates from heart disease are amongst the highest that are found, and they are not pre-eminently industrial. From this it would appear that, though the environmental conditions that are associated with great intensity of industrial activity may have some influence in determining the incidence of heart disease, it cannot be said from the present data that an excessive mortality from this cause is a feature in all the boroughs that may be described as industrial.

*Conclusions.*

From the data that have been investigated, it seems reasonable to draw the following conclusions :—

1. The mortality from heart disease in the counties of England and Wales shows quite definitely a tendency to a special distribution in which the higher death-rates are found in the counties towards the west.

2. The geographical distribution of the relative mortalities in the periods examined is very different from that described by Haviland as occurring in data for an earlier epoch, and the explanation offered by him—namely, that the excessive incidence is found in counties that are distant from the sea and sheltered by their physical surroundings from the sea winds, cannot be held to account for the distribution of the fluctuations in incidence in the present data.

3. A definite association exists in the counties between the distribution of mortality from organic heart disease and heart diseases in the aggregate and the mortality from acute rheumatism. The relative incidence of acute rheumatism appears to be the essential factor that determines the incidence of heart disease, although other factors, possibly mainly environmental, may have some influence on the rate of mortality in different districts.

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# THE THERAPEUTIC PROPERTIES OF STOVARSOL

## (ACETYLAMINOPHENYLARSINIC ACID, "190").

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THE acetyl derivative of amino-oxy-phenylarsinic acid, first introduced into therapeutics in 1922, possesses such interesting curative and preventive properties that it has seemed to me to be of sufficient importance to warrant a review of the question to the point to which it has now developed. I shall first outline the facts relating to the discovery of the parasiticidal properties of stovarsol, and then review the results obtained with this product in syphilis, yaws, malaria, amœbiasis, and other intestinal parasitic infections.

*Historical.*

Acetylaminophenylarsinic acid was first prepared in Germany by Ehrlich, Benda, and Bertheim,[1] but the compound was not systematically examined by these authors. As a matter of fact, it belongs to the series of arsenical compounds known as "arsinic acids," in which the arsenic is pentavalent, and Ehrlich considered the members of these series quite inferior to the "arsenobenzenes," in which the arsenic is trivalent. However, in 1922, Fourneau,[2] at the Institut Pasteur, decided to re-investigate the arsinic acids, believing the unsatisfactory results obtained in Germany to be directly attributable to the presence of certain impurities which the compounds of these series are apt to contain. Fourneau, and his co-workers Mr. and Mme. Trefouel, re-prepared almost all the members of the series, carefully purified them, and then tested them on both animals and human beings, injecting them either intramuscularly or subcutaneously. Tests were carried out with amino-oxy-phenylarsinic acid ("189") and stovarsol ("190") in experimental syphilis by Levaditi and Navarro-Martin,[3] and in human syphilis by L. Fournier and his co-workers, Guenot and Schwartz.[4] The results obtained in human syphilis were very interesting; however, in view of the fact that relapses were observed, the product, thus administered, did not seem to have an action comparable to that of the arsenobenzenes.

Such was the condition of affairs when, following their studies on the action of bismuth compounds, Sazerac and Levaditi [5] demonstrated the value of a prophylaxis of syphilis by the simple ingestion of an efficient spirillicidal compound, a method in itself more practical than injections or local applications of pomades. The experiments carried out with soluble bismuth salts (lactate) administered by the mouth having failed to give very encouraging results, Levaditi and Navarro-Martin [6] then tried the arsenicals. Inasmuch as they had already tested acetylamino-oxyphenylarsinic acid in subcutaneous injection, they used the same compound, prepared by Mr. and Mme. Trefouel according to Fourneau's directions, and this time they administered it by the mouth.

The experiments were undertaken first from the prophylactic and then from the curative standpoint. The first observations showed that stovarsol exerted, in man as well as in small animals, a distinct prophylactic and curative action in syphilis. These were completed by numerous and convincing clinical observations by Fournier and his co-workers. Thus was inaugurated the introduction into the therapy of syphilis of an arsinic acid administered by the mouth. In what follows we shall see to what an extent this therapy has developed.

*General Considerations.*

It is quite proper to ask, at this juncture, if indeed this new therapy offers any advantages over the older methods of administering arsenical compounds. From the very beginning of their work, Levaditi and Navarro-Martin noticed that, when given by the mouth in experimental syphilis, stovarsol was more active than when injected under the skin or into the muscle. At the same time they remarked that its toxicity was greater in the first case than in the second. (In this connexion cf. the clinical observations of Fournier and his colleagues, and the recent researches of Navarro-Martin and of Kolle.[7]) How was this surprising fact to be explained? Very probably the compound undergoes in the intestine or in the liver certain modifications more favourable to its therapeutic action than the changes which take place in the other tissues or in the general circulation. The intestinal tract, then, is more favourable to the development of the therapeutic effects of stovarsol, and this is a distinct advantage. Again, it often happens, in practice, that it is impossible to treat syphilitic patients by the injection (even intramuscular) of any spirillicidal compound whatever. It may also be necessary with some patients to give a supporting treatment during the interval between two series of arsenic or bismuth injections. Such a treatment is easily given with stovarsol. These constitute serious arguments in favour of this new therapy per os.

Let us now examine briefly what we know of the results obtained with stovarsol in syphilis, and in other diseases such as yaws, the intestinal parasitoses, malaria, and, in fact, wherever the use of this compound has afforded an opportunity of collecting interesting data.

### 1. *Stovarsol in Syphilis.*

Besides the first experiments of Levaditi and Navarro-Martin, referred to above, particular attention should be called to the work of Fournier and his co-workers, Levaditi, Navarro-Martin, and Schwartz.[8] These authors treated 80 syphilitic patients by ingestion of stovarsol in the form of tablets containing 0·25 g. Four tablets, representing a dose of 1 g., were given every morning in a little water before breakfast in periods of from five to seven days, each period being followed by an interval of equal length. In this way a total dose of 12–16 g. of stovarsol was given the first month. This method of administration was decided upon with two ideas in view: First, better arsenical impregnation, and second, prevention of accumulation. (Mr. and Mme. Trefouel had previously demonstrated that the elimination of the arsenic, which is abundant during the first two or three days, decreases very considerably on the following days.)

According to these authors, stovarsol exerts, in a great number of cases, a remarkable action on the primary, secondary, and tertiary erosive and ulcerous lesions, an action which is often as rapid as that of the arsenobenzenes given intravenously. The product induces a rapid healing of the superficial syphilitic lesions; it is capable of arresting the evolution of the disease and of exerting a favourable effect on the blood reaction. As a matter of fact, Fournier and his co-workers have published a number of serological curves in which are shown either the rapid negativation of a sero-reaction which was strongly positive at the beginning of the treatment, or the maintenance of a negative Wassermann in cases where the treatment with stovarsol was begun in the pre-serological period. To this must be added the excellent tonic effect which the compound exerts on the general condition of the patients. Naturally enough, as with every other arsenic compound, there will be encountered some cases both of arseno-resistance and of relapse. For this reason, Fournier and his fellow-workers look upon stovarsol as a weapon to be used in attack either alone or in association with another specific such as bismuth. "The benefit of the absorption of '190' (stovarsol) per os is absolutely real in every case where, for any reason whatsoever, intravenous or subcutaneous injections of antisyphilitic medicaments are impracticable."

The results of these researches have been generally confirmed by several authors in France as well as in Germany. In France, Yovanowitch,[9] in a noteworthy thesis, declares that stovarsol has a marked antisyphilitic power, comparable with that of the arsenobenzenes and the salts of bismuth. Its action is directed, however, very much more against the infectious cutaneous and mucous lesions, which it sterilises, than against the serological reactions, which it influences more slowly than either bismuth or the arsenobenzenes. Thus, whereas in some cases the author has recorded a total negativation of the Wassermann, in others there was only a marked attenuation of the reaction. However, the author himself recognises that the treatment with stovarsol was never very intensive. "It is logical to think," says Yovanowitch, "that with stronger doses the stovarsol would have exerted a deeper action on the evolution of the syphilis, and would have more strongly influenced the Bordet-Wassermann reaction."

Again, Cadenaule and Clarac[10] report evidence to show that hereditary syphilis is susceptible of being treated efficaciously by stovarsol. One of their observations is to the effect that stovarsol, given half an hour before feeding, is perfectly tolerated by the new-born, that there is advantage in administering high doses (0·12 g. per day for a child weighing 3 kilos), and that the results are most satisfying: disappearance of the cutaneous lesions and of the coryza, marked general improvement, and increase in weight.

In Germany we would call attention to the work of Oppenheim, of Heymann, and of Weitgasser. The first-named author[11] finds that stovarsol administered per os acts in a manner which is rigorously specific even in a dose of 0·25 g. He gives six observations in support of this view. The product acts on the syphilitic lesions and the treponema quite as strongly as mercury, bismuth, or salvarsan. In a second and longer report,[12] Oppenheim describes a large number of observations which permit him to form the conclusion that no other antisyphilitic agent given per os exerts as marked a therapeutic action as stovarsol, which, when properly administered, is perfectly well tolerated by the patients. Its influence on the treponema and upon the specific lesions is comparable with that of the arsenobenzenes; moreover, it determines an increase in weight. Apparently relapses are rare, for Oppenheim reports only two out of the 83 cases treated.

The indications are hypersensitiveness to salvarsan, difficulty of giving intravenous injections, impossibility of applications other than per os, replacing salvarsan in its association with mercury or bismuth. According to Oppenheim, the treponemata disappear in 24–48 hours, the primary lesions heal in 5–15 days, while the eruptive manifestations of the disease disappear in a few days.

The conclusions of Heymann[13] are very similar to the above. They show that stovarsol is perfectly tolerated[14] even when given in daily doses of 1 g., and a total dose of 20 g. in a month. The author believes that this compound is, at the present time, the most active antisyphilitic agent which can be given per os. It has a most satisfactory action on all of the ordinary manifestations of syphilis, and exerts a favourable influence on the Wassermann reaction. Heymann is likewise of the opinion that stovarsol can be administered in conjunction with bismuth or mercury. Weitgasser[15] is more reserved in his opinion. He recognises the manifest spirillicidal action of the new product, but has not so far observed any profound and lasting effect on the Wassermann. The question may be asked, however, whether, in the cases treated by Weitgasser, the treatment was sufficiently intensive.

From the foregoing, the basis for the use of stovarsol as an antisyphilitic seems firmly established. In our own opinion, the new medication is applicable to the rapid sterilisation and healing of the specific lesions, whatever they are: in other words, it constitutes a method of curative prophylaxis of which the advantages cannot be overrated. If, in a great many cases, treatment exclusively by stovarsol is sufficient to determine healing of the lesions and to render the Wassermann persistently negative, in other cases it is necessary to associate with stovarsol another powerful specific drug, having a somewhat deeper and more durable action, such as bismuth. The advantages of an arsenical treatment with stovarsol lie in the spirillicidal strength of the compound, the ease with which it is administered, and its general tonic action on the whole system.

### 2. *Stovarsol in Yaws.*

Yaws, the ulcerous disease caused by *Spirochæta pertenuis* (Castellani), responds, like syphilis, to treatment with stovarsol. This has been demonstrated by the recent work of Beurnier and Clapier,[16] who report excellent results. They recommend doses not exceeding 1 g. in 24 hours, an entire cure requiring 8 g. for an adult weighing 50 kilos. Baermann[17] has studied the preventive action of stovarsol in yaws, and has observed that the compound given in a total dose of 3·75 g. in four days is capable of protecting man from a massive infection. He reports similar results with monkeys. Tanon and Jamot[18] remark that stovarsol cures the lesions of yaws even when they have proven resistant to the arsenobenzenes. They further observe that children seem to tolerate the product as well as adults, that it is advantageous to administer stronger doses at the beginning and to reduce them later, and, finally, that the fact that its administration by the mouth makes

it very acceptable to the natives, who exhibit a certain apprehension of injections in general, of whatever sort.

To close this chapter on the spirillary diseases curable by stovarsol, let us simply mention intestinal spirochætosis (Waldorp [19]), ulcero-membranous stomatitis (Sabrazes [20]), spirillary bronchitis (Fontanel [21]), (Couvy [22]), phagedenic ulcer (Couvy [23]), Vincent's angina (Couvy [24]), (Cot [25]), &c.

### 3. *Stovarsol in the Intestinal Parasitoses.*

Ravaut [26] was the first to use arsenicals by the mouth in the treatment of intestinal amœbiasis. He used the arsenobenzenes for this purpose, and stated the facts in favour of this method. But it is to Marchoux [27] that we owe the discovery of the parasiticidal and curative action of stovarsol in amœboid dysentery and intestinal lambliasis. In two papers published in 1923 he reported the first results obtained with stovarsol in the treatment of these diseases. His observations have been confirmed by Delanoe,[28] Leger and Nogue,[29] Fontanel,[30] Rubenthaler and Jansion,[31] Leon Bernard and Thomas,[32] and still more recently by Petzetakis.[33] Marchoux has recently published [34] a review of the results obtained, and we cannot do better than to give a summary of his paper at this point.

#### *Amœbiasis.*

Between March, 1923, and July, 1924, Marchoux treated by means of stovarsol 59 patients infected with *Amœba dysenteriæ*. The infections had been obtained in France, Germany, Orient, Morocco, Syria, and in the French Colonies. Of these 59 patients, all but two were very successfully treated. Of these two, the first had a dysentery which resisted every treatment tried, while the second showed improvement only while the treatment was in progress. In all the other cases the amœba and the cysts disappeared on the second or third day, while the quantity of stools diminished and their consistency became firmer. In addition, there was a general improvement in the general health of the patients, and a subsiding of the secondary effects of the infection. In order to avoid any possibility of relapse, Marchoux recommends a supporting treatment of two tablets a day (0·50 g.), the medicine being taken regularly at meal-time for six weeks. Certain dietary precautions are also recommended: complete abstention from tobacco, from all alcoholic beverages, and from fresh butter.

Petzetakis, of Athens, has treated with stovarsol a number of cases of intestinal amœbiasis, lambliasis, and diarrhœa due to various species of trichomona, and comes to the following conclusions. Stovarsol is an excellent remedy for the intestinal parasitoses. The compound destroys the amœba, and in some cases its favourable action is evident during the first 24 hours of treatment. There are some cases, however, which prove resistant or which relapse. He suggests that in these cases the dosage be increased or the treatment prolonged. The treatment is applicable to children as well as to adults. Finally, Petzetakis insists upon the fact that stovarsol exerts a *preventive* action against infection by *Amœba dysenteriæ*, and mentions a case in support of this contention.

#### *Lambliasis.*

Marchoux [35] has treated 21 cases of intestinal lambliasis, with diarrhœa and presence of lamblia in the fæces. Treatment with stovarsol produced an immediate improvement, and, even with small doses, the cysts disappeared from the fæces. In some cases, however, the cysts reappeared if treatment was stopped completely. A supporting treatment of 0·25 g. (one tablet) of stovarsol per day is therefore recommended. According to Marchoux [36] stovarsol always destroys the blastocysts, which are the cause of the persistent diarrhœa.

#### *Malaria.*

If, on the one hand, Baermann (loc. cit.) was nable to obtain a preventive action in tertian malaria by using stovarsol as a prophylactic agent, on the other hand Valenti and Tomaselli [37] have called attention to the efficacy of the product given per os in tertian and quartan fever. In a short paper, which appeared last September, these authors cited a case of malaria (quartan type), with repeated accesses of fever extending over a year, which had resisted intensive treatment with quinine. Plasmodia were present in the blood-stream. Treatment was begun with stovarsol (one tablet the first day and two tablets each day following). There was a single access of fever after beginning the treatment and no relapse, although the patient was observed for more than a month afterward, and in spite of the fact that the stovarsol was discontinued on the eleventh day. The plasmodia disappeared from the blood-stream on the sixth day. The second case was similar to the first except that it was of the tertian type.

Independent of Valenti and Tomaselli, Marchoux and Cohen [38] have studied the action of stovarsol in tertian malaria in general paralytics intentionally infected (method of Wagner). Seven patients were treated by intravenous injection of a solution of the sodium salt of stovarsol. The product seemed active to the extent that the attacks of fever ceased and the parasites disappeared from the blood-stream. In a second paper, Marchoux [39] describes the results of experiments undertaken with 136 malarial patients at Marengo, Algeria. The treatment consisted of the ingestion of 1 g. of stovarsol per day, or the intravenous injection of a similar quantity of its sodium salt. Marchoux concluded that stovarsol is effective against *Plasmodium vivax*, but does not seem to be very active against either *Plasmodium malariæ* or *Plasmodium falciparum*.

Although these observations are still not sufficiently numerous to permit the formulation of definite conclusions, it would appear that stovarsol, either given per os or by intravenous injection of its sodium salt, acts on malaria causing the disappearance of the parasites and a suppression of the accesses of fever. It will be for further research to show whether or not certain forms of malaria respond to this treatment, and whether or not the curative action is lasting. In any case, these researches will be of particular interest.

#### *Conclusion.*

Starting with a study of the prophylaxis of syphilis by way of the mouth, the field of action of stovarsol has become, in a very few years, greatly enlarged. One after the other, the treatment of syphilis, of yaws, of spirillary infections in general, of amœboid dysentery, of intestinal lambliasis, of the blastocystic diarrhœas, and, very probably, of malaria also have benefited by this new arsenic compound or rather by this new method of treatment per os. The efficacy of the method, its exceeding simplicity, and the security which it gives in a multitude of circumstances render it worthy of the attention of medical men, who, in their turn, are called upon to pass judgment upon it without any preconceived ideas, as is always proper when it is a question of controlling the observations made by conscientious workers.

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# Clinical and Laboratory Notes.

## A CASE OF LUMINAL POISONING.

BY HILDRED CARLILL, M.D. CAMB., M.R.C.P. LOND.,
PHYSICIAN TO WESTMINSTER HOSPITAL.

THE following case of poisoning with luminal is probably worthy of record, for the symptoms, although alarming at the time, were followed by complete recovery.

A sober woman of 69, in collision with a cyclist on Nov. 24th, 1924, received a blow on the back of the head which momentarily stunned her. She found her way home and at once exhibited evidence of mental impairment. For example, she filled hot-water bottles with cold water, and next morning came downstairs with fish knives in her hair and proceeded to pour out tea into the milk jug. The sphincters were uncontrolled.

She was admitted to hospital on Dec. 1st, garrulous, incoherent, confused, and incontinent. There was an unclean scalp wound over the occiput in the middle line. There was no evidence of fracture, intracranial hæmorrhage, or defect of the visual apparatus, but the left pupil was larger than the right. There was no aphasia or paresis, and there was no sign of affection of the motor or sensory pathways. The systolic and diastolic blood pressure measured 140 mm. and 80 mm. of mercury respectively. The serum and cerebro-spinal fluid were healthy.

By Dec. 24th her symptoms had somewhat abated and the sphincters were controlled. She was still restless, garrulous, and confused. Luminal and potassium bromide in small doses were prescribed but, inadvertently, gr. 10 of the former and gr. 50 of the latter were administered daily for 12 days (total luminal gr. 120, potassium bromide gr. 600). On the twelfth day, Jan. 4th, 1925, she became stuporose and had a recurrence of double incontinence. The pupils were much contracted and lost their reaction to light. At times there was a divergent squint. The pulse-rate was increased. The cerebro-spinal fluid was under normal pressure. The urine contained no hæmatoporphyrin. After stimulation and a long delay she feebly obeyed certain instructions. Energetic treatment was employed in the form of strychnine, hot coffee by mouth and rectum, oxygen, and faradism. The luminal and bromide were cancelled. For a few days the periods of mental alertness increased in length but on each occasion she relapsed rapidly into stupor. Her conversation showed extreme confusion of thought. The tendon and superficial reflexes were unaffected throughout. By Jan. 10th the urgent symptoms were relieved and the sphincters once more under control. The systolic blood pressure measured 120 mm. of mercury. The pupils remained unequal and reacted to light very sluggishly. Then followed a period of four weeks in which she was greatly confused. On Jan. 19th, for example, her answers to questions were as follow. Year?—March. Age?—59. Year of birth?—1956. Age?—Westerham. War?—China versus Chilians. Her handwriting was illegible and her composition grotesque. She knew not where or who she was. She expressed a fear of being killed by a firing party, and she said that her sister had fallen into a basket of damsons and, not being a business woman, would lose her money. She saw pistols in the hands of other patients and said that they wore leather helmets as a precaution against being killed. Her intelligence, judged by the accuracy of her replies to questions, varied from hour to hour. Rarely could her attention be secured.

On Feb. 10th Dr. H. J. Norman saw her with me and found her depressed and anxious, readily confused, and unduly apprehensive. The next day she rushed screaming round the ward and refused to be pacified until the windows, which had been closed for the round, were reopened. On Feb. 12th she made a sudden and complete recovery and her memory for the recent and distant past was once more clear.

Convalescence has been uninterrupted. She went to the seaside on March 5th, and recently I have had from her a grateful letter of a woman in complete possession of all her faculties. I call attention to the amount of the drugs taken, the value of faradism in treatment, and the avoidance of certification.

(*Continued from previous page.*)

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## A CASE OF
## RENAL GLYCOSURIA WITH KETONURIA.

BY J. PATTERSON, M.SC., PH.D.

(*From the Biochemical Department, Charing Cross Hospital.*)

WHILE the crucial means for distinguishing between diabetes mellitus and renal glycosuria lies with the sugar-tolerance test, it is generally recognised that confirmatory to a normal curve indicating renal glycosuria is a urine examination showing a fairly constant and low value for the percentage of sugar, with the complete absence of acetone bodies. A negative finding with regard to these latter substances is such an invariable result in this type of case that one might have assumed reasonable certainty in diagnosing diabetes wherever an obviously positive glucose test was accompanied by an authentic acetone reaction in the urine. In only one case of renal glycosuria so far described (Allen, Wishart, and Smith, 1919,[1]) have ketone bodies been detected, but then only at the time the patient was admitted to hospital, for when placed on full diet the acetone test immediately became negative.

It would seem, therefore, to be of interest to supply a few details pertaining to a case which was quite exceptional in that the urinary examination was apparently contradictory to the findings based on blood analysis.

### *Clinical Record.*

The patient, a man aged 42, was admitted to hospital with a history suggestive of pulmonary tuberculosis and diabetes.

*History.*—In 1911 he underwent an operation for gastric ulcer, at which time he was discovered to have sugar in the urine and was evidently regarded as diabetic. Later, he attended a hospital as an out-patient for six months, being told to diet carefully. Towards the end of 1918 he developed a bad cough, afterwards began to have night-sweats, and also brought up dark-coloured sputum. He had dyspnœa on exertion and suffered from loss of strength. Going before a medical board, he was X rayed and phthisis suspected, but shortly afterwards the cough improved and the night-sweats ceased. During the last six months preceding admission, dry red rashes appeared on the left thigh, both forearms, and scrotum. He had been thereupon examined at a skin hospital, where it was believed his skin disease was related to a diabetic condition.

No evidence of active pulmonary tuberculosis being found, a brief inquiry into his "diabetic" condition was instituted, with the results recorded below.

### *Chemical Findings.*

1. *On full diet.*—Sugar and acetone constantly present in the urine, former identified as glucose in the form of phenylglucosazone; amount varying from 0·5 to 3 per cent.; latter confirmed by Lieben and by Gunning tests after distillation.

| | Blood-sugar. | Nitro-prusside test. |
|---|---|---|
| 29/1/25 ..... | 0·091 .. .. .. | + |
| 30/1/25 ..... | 0·085 .. .. .. | + |
| 31/1/25 ..... | 0·090 .. .. .. | + |

[1] Arch. Int. Med., xxiv., 523

2. *Potatoes withdrawn from full diet.*—Sugar absent from urine the first day, reappearing to the extent of 2 per cent. on subsequent days. Acetone as before.

3. *Starvation.*—Sugar absent within 24 hours, marked nitro-prusside reaction first day with positive Gerhardt test, intense colour reactions on the second day, after which the patient was restored to full diet.

4. *Glucose-tolerance tests.*

| — | Blood-sugar. | Urine. | |
|---|---|---|---|
| | | Sugar. | (1) Acetone diacetic. (2) β-Hydroxybutyric. |
| (*a*) (6/2/25) | | per cent. | mg. per cent. |
| Before glucose . . | 0·085 | 0·65 | (1) 10·6 (2) 20·0 |
| After glucose . . | — | 1·80 | (1) 7·3 |
| ½ hour . . | 0·121 | — | — |
| 1 „ . . | 0·120 | — | — |
| 2 hours . . | 0·097 | — | — |
| 3 „ . . | 0·075 | — | — |
| (*b*) (12/2/25) | | | |
| Before glucose . . | 0·090 | 2·0 | (1) 4·0 |
| After glucose . . | — | 3·2 | (1) 2·6 |
| 2 hours . . | 0·103 | — | — |
| 3 „ . . | 0·080 | — | — |

Urines collected for four-hour periods both before and after glucose.

5. *Other findings.*—Blood-urea, 32 mg. per 100 c.cm.; cholesterol, 0·250 per cent.; urea concentration (1) 3·1 per cent., (2) 3·6 per cent. Acetone plus aceto-acetic acid and hydroxybutyric acid were estimated by the method of Wrigglesworth (1924),[2] and are much in excess of the most recent average normal values, which are given by Hubbard and Noback (1925)[3] as 0·9 mg. per 100 c.cm. and 0·46 mg. respectively.

*Discussion.*

The most striking feature, then, is the continuous excretion of acetone bodies, a fact not merely based on a positive reaction but confirmed by more conclusive tests. Its relation to the sugar excretion, itself rather greater and at the same time more variable than in the typical renal glycosuria, is difficult to follow. The mere loss of about 20 g. of sugar per day would normally hardly result in the appearance of acetone, especially where it could be shown that the withdrawal of carbohydrate in the form of potatoes from the diet, or on the other hand, the addition of glucose, had no appreciable effect.

The appearance of a ketonuria in these circumstances is evidently contrary to the present-day theories as to the relationship between carbohydrate and fat metabolism, unless it be assumed that in addition to a very low threshold for sugar the patient had also a lowered threshold for acetone. Unfortunately it was not found possible to carry the investigation further in order to establish whether this were so or not, but since the abnormality cannot be accounted for on the basis of lack of carbohydrate utilisation, it seems feasible to suggest that its cause is a parallel one to that responsible for the abnormality of the accompanying sugar excretion.

[2] Biochem. Jour., xviii., 1203. [3] Jour. Biol. Chem., lxiii., 391.

# BRITISH MEDICAL ASSOCIATION.

## ANNUAL MEETING AT BATH.

## SECTION OF LARYNGOLOGY, OTOLOGY AND RHINOLOGY.

THIS Section met on three days, under the presidency of Mr. Arthur H. Cheatle.

### WEDNESDAY, JULY 22ND.

### OVERLOOKED CASES OF FOREIGN BODY IN THE AIR AND FOOD PASSAGES.

A discussion on this subject was opened by Prof. Chevalier Jackson (Philadelphia). He said that his presentation of the subject was from the individual viewpoint of one who metaphorically as well as actually saw narrowly through a small tube; for the broader viewpoint the audience was referred to the internist. Of the 1485 cases of foreign bodies that had come to Prof. Jackson's bronchoscopic clinic in the past 20 years there were over 200 in which foreign bodies had been overlooked for periods of from one month to 36 years. A broad consideration of the histories of these cases showed the outstanding fact that the failure to recognise the presence of a foreign body was due not so frequently to inability to make the diagnosis, as to failure to attach sufficient importance to the consideration of foreign body as a diagnostic possibility. Foreign bodies had been regarded as curiosities of medicine rather than routine possibilities for exclusion. A careful analysis of all the cases in which records were accurate, however, showed that the chief factors in the overlooking of the foreign bodies (not in the ætiology of the accidents themselves) were as follows: (1) Failure to consider foreign body as a diagnostic possibility. (2) Absence of a history of foreign body as proven by over 100 cases at the clinic. (3) Scepticism as to the possibility of the presence of a foreign body, in some instances even in the face of a very positive circumstantial history of the accident. (4) The apathetic attitude of the practitioner. (5) The symptomless interval which usually elapsed after the swallowing of a foreign body. (6) Multiplicity of foreign bodies, one being removed, but others being left behind; this could be avoided by X ray examination after as well as before operation. (7) Waiting for spontaneous expulsion of the foreign body. (8) Simulation, in foreign body cases, of the signs and symptoms of common diseases, such as tuberculosis, asthma, bronchitis, pneumonia, empyema, bronchiectasis; foreign body in the lung would continue to be overlooked until the practitioner deemed it necessary to exclude foreign body in every case of acute or chronic pulmonary disease. (9) Lack of emphasis, in medical teaching, on the exclusion of foreign body in every case of acute or chronic disease of the chest. (10) Groundless assumption of passage by the bowel. (11) Character of the foreign body; vegetable seeds, for example, which did not cast a shadow on X ray examination, might be overlooked. Occasionally, even after a diagnostic bronchoscopy, there might be uncertainty as to the possibility of a small fragment of non-opaque foreign body in a minute bronchial branch; such cases required watching, for sooner or later signs would develop. Every case in which there was the slightest intimation of a foreign body accident, or of the patient having had an attack of choking, gagging, strangling, or coughing, should be regarded as a prima facie case of foreign body. A foreign body, he said, should be regarded as present until the contrary was proven by every means at command. The justification for that rather strong statement was that among his cases there were dozens of histories in which a child after having choked and gagged with food or some foreign substance in his mouth was taken to a practitioner or to a dispensary, or to an out-patient clinic, when entirely symptomless. Physical examination being negative, the parents were reassured and the child sent away. The symptomless interval, often of prolonged duration, prevented connexion of the initial symptoms with the tardy development of the symptoms of foreign body. The Rontgen ray was the most valuable diagnostic means in suspected foreign body; but careful notation of physical signs by an expert should be made in all cases. Expert X ray work would show all metallic foreign bodies and many of less density, such as teeth, bones, shells, buttons, and so forth. If the X ray was negative for foreign body but indicated bronchial obstruction, a diagnostic bronchoscopy should be done. Peanut kernels and water-

melon seeds in bronchi produced obstructive emphysema of the invaded side, which should be distinguished from compensatory emphysema, in which the ballooning was in the unobstructed lung.

The relative rarity of foreign body in the air and food passages should not render it an unreasonable rule to exclude foreign body in every ailing child, for was it not a rule for all internists and pædiatricians to exclude Banti's disease as a matter of routine—yet what single clinician or clinic ever saw 1400 cases of Banti's disease? As regards the treatment of overlooked foreign bodies in the lungs, it might be said that 98 per cent. of the localisable foreign bodies of appreciable size that had reached the trachea, bronchi, or parenchyma of the lung through the mouth could be removed by peroral bronchoscopy, and no procedure other than peroral bronchoscopy was entitled to a moment's consideration in the ordinary case of foreign body in the lung. One of the most remarkable things was the recuperative power of the lung from a seemingly very serious pathological condition by a foreign body after the intruder had been removed.

After his opening address Prof. Jackson gave a demonstration on the manikin of mechanical problems of the bronchoscopic and œsophagoscopic extraction of foreign bodies from the air and food passages. After this demonstration he exhibited a number of cinematograph films demonstrating bronchoscopic aspiration for suppurative diseases of the lung of other than foreign body origin; it was remarkable to note the absence of discomfort in patients in whom bronchoscopes were passed into the lungs for aspiration, without any anæsthetic, local or general, in the skilled hands of Prof. Jackson's assistant, Dr. Gabriel Tucker.

Prof. Thomas McCrae (Philadelphia) said that the association of physicians with laryngologists was necessary if there was to be any improvement in the handling of the problem of foreign bodies in the lung. The bronchoscopist had the right to ask the general practitioner and the internal physician that they should be alert and make the diagnosis promptly; they, on their side, had the right to ask that certain laryngologists at least should acquire such skill in bronchoscopy that they could have patients referred to them in the assurance that they would be skilfully handled, and that if necessary a bronchoscopy for diagnosis could be done with perfect safety. He placed emphasis on the importance of the failure to consider the possibility of a foreign body in the air passages; to lessen that mistake a steady process of education was essential, and so long as a foreign body in a bronchus was regarded as something like a fairy tale little progress could be made.

Sir StClair Thomson (London) expressed the thanks of the meeting for Prof. Jackson's brilliant demonstration; he thought that foreign bodies in the air and food passages must be more common in America than in this country, and he blamed the acquisitive habits of the American child.

Sir William Milligan (Manchester) said that he regarded the intimate coöperation with the radiologist as of the utmost value, but where a negative report was given he thought that in any doubtful case an endoscopic examination should be made. He was in favour of a second X ray examination being made after the removal of the foreign body as other foreign bodies might be present. He had known of cases being treated as tuberculosis for years, and clearing up at once on removal of an unsuspected foreign body.

Mr. Herbert Tilley (London) described a typical case of overlooked foreign body, that of a boy who inhaled a paper-fastener into the left bronchus, which illustrated some of the pitfalls which might lead to the overlooking of a foreign body; the chief reason why the case had drifted on was that the chest was not radiographed by an expert directly the trouble occurred. He wondered how many cases of "bronchiectasis," "bronchitis," "pneumonia," and "tuberculosis without tubercle bacilli" had been caused by the presence of an overlooked foreign body, and referred to cases which he had recorded in THE LANCET.[1] If the foreign body was not opaque to X rays the chest should be screened at the moment of full inspiration and again on deep expiration, and a comparison of the two negatives would often show striking differences.

Sir James Dundas-Grant (London) described several cases of overlooked foreign body which had occurred within his own experience. He asked about the use of lipiodol and bismuth in the detection of non-opaque foreign bodies.

Mr. Douglas Crow (Brighton) detailed some of the early difficulties which he had experienced in bronchoscopy; he had found that the practitioner sometimes overlooked the bronchoscopist as well as the foreign body, even when the latter had been demonstrated by X rays.

Mr. G. Ewart Martin (Edinburgh) discussed chiefly the possibilities of the bronchoscope in the diagnosis and treatment of certain affections of the chest: he had obtained very satisfactory results, particularly in the treatment of bronchiectasis by bronchoscopic lavage.

Mr. E. B. Waggett (London) maintained that no examination for suspected foreign body was complete without a skiagram taken in the right antero-lateral position, as in well-developed adults lateral skiagrams of the chest were often obscure.

Mr. Musgrave Woodman (Birmingham) described two cases which came under the category of overlooked foreign bodies in the œsophagus, and showed lantern slides illustrating them.

Dr. P. Watson-Williams (Bristol) referred to the pulmonary symptoms in bronchial occlusion.

In the afternoon, at the Bath Ear, Nose, and Throat Hospital, Mr. V. E. Negus read a paper on evolutionary factors in the causation of pharyngeal diverticula, and also demonstrated a large number of specimens which he had dissected, to illustrate the comparative anatomy of the nose and throat.

Mr. Irwin Moore read a paper on the history of endoscopy, and demonstrated a number of valuable specimens from the special Endoscopic Museum which was the chief feature of the Pathological Museum of the Annual Meeting and for which he had collected a large number of pathological specimens, endoscopic instruments, &c., from all over the country.

### THURSDAY, JULY 23RD.

#### *Chronic Middle-Ear Suppuration.*

Mr. G. J. Jenkins (London) opened a discussion on the operative treatment of this condition. He said that operations in cases of chronic suppurative disease of the middle ear were undertaken primarily for the removal of the conditions which were potentially dangerous; secondarily in order to get rid of an offensive state which often necessitated a good deal of care and daily attention; and also, in some instances, with the possibility of improving the hearing. Of recent years many otologists in all parts of the world had been experimenting with methods that were something between the Schwartze operation and the radical mastoid, and which had been termed "conservative mastoid" or "modified radical mastoid" operations. This endeavour to find something better than the radical mastoid operation must have arisen because the latter had been found to be insufficient or defective in some respects. The result was not always satisfactory; sometimes the Eustachian tube remained patent, no matter how carefully that had been provided against. Often the hearing was damaged and sometimes the ear required careful attention for years, even when epithelialisation had been quite satisfactory. Whatever operation was done, the objects should be: (1) to remove all foci of potential danger; (2) to retain the maximum hearing; and (3) to leave a state of affairs that would necessitate the least

[1] THE LANCET, 1908, ii., 1359, and 1911, i., 1066.

possible after-attention. Rapidity of healing was a secondary consideration. The cases could be divided into three groups. In the first, the hearing was good, almost as good as in a normal ear, the mechanism of the middle ear not having apparently been damaged; in the second group were included those cases in which the middle ear conducting apparatus had been involved; the third group included those cases in which there was evidence of a gross lesion of the wall of the labyrinth or of the labyrinth itself. In the second group he had tried a modified radical operation of his own devising, the special clinical features which constituted suitability being the presence of a small perforation entirely or almost entirely surrounded by membrane, and evidence that the incus had been damaged; altogether he had operated on 38 cases. The operation might be described as an extended Schwartze operation, with removal of the incus, and the obliteration of the antrum and mastoid cavity by means of a flap of periosteum. The object in removing the incus was, first, to eliminate what he believed to be an important focus of disease which was unlikely to clear up spontaneously; and, second, by its removal he thought that ample drainage would be provided for the antral region until healing had occurred. When, however, there was a serious affection of the tympanic cavity, and especially when the tympanic membrane was extensively destroyed, Mr. Jenkins did not think the results from any form of conservative operation were equal to or as good as those of the radical mastoid operation.

Mr. Sydney Scott (London) said that in a case open to doubt as to the necessity for extirpation of the tympanum, when there was no cholesteatoma and no labyrinth disease, even where hearing was very defective, it was permissible to watch the effect of Schwartze's operation as modified by Küster before advising conversion to the epitympanic operation or to the radical operation. For years at St. Bartholomew's Hospital they had recognised the advantages in operating in two stages on conservative principles. Mr. Jenkins had systematised a new stage of conservatism, not a new stage of eradication.

Mr. J. Bowring Horgan (Cork) emphasised that in the overwhelming majority of cases the aural calamity which was designated by the name of chronic suppurative otitis media was a preventable calamity, and that the best treatment of that condition was the thorough and courageous treatment of its progenitor, acute suppurative otitis media. As regards operative treatment, he was convinced of the great value of the primary skin graft in mastoid operations.

Mr. H. Norman Barnett (Bath) said that chronic middle-ear disease was an eminently curable condition, and if under observation and careful treatment it had not been cured in four to six weeks he advised operation and opened up the mastoid antrum. He pleaded earnestly for an early exploration of the mastoid antrum in cases of chronic ear discharge, as it was quite useless ordering drops for such a patient.

Sir James Dundas-Grant said that among the operations for chronic suppurative otitis media the claims of the operation of ossiculectomy had been overlooked. The ossicles seemed sometimes to dam up the discharge, causing violent symptoms which apparently called for a radical mastoid operation; but he had not infrequently found that the symptoms entirely subsided after the removal of the ossicles.

Dr. W. S. Syme (Glasgow) said it was most important to define the actual limits of the disease. The performance of a conservative operation could now be recommended at a much earlier period in well-defined cases in which formerly a radical mastoid operation would have been recommended.

Mr. J. Aldington Gibb (Maidstone) said that recently he had adopted as a conservative measure with good results the transmastoid atticotomy of Bondy, as practised by Sourdille and others in France.

*Chronic Non-Suppurative Middle-Ear Deafness.*

A discussion on the treatment of chronic non-suppurative middle-ear deafness (excluding otosclerosis) was opened by Sir William Milligan, who said that while otology had made great strides in the past quarter of a century, more especially in the treatment of suppurative disease in and around the middle and internal ears, the treatment of chronic catarrhal and otosclerotic lesions remained practically at a standstill. If it was admitted that in advanced chronic catarrhal otitis media anything approaching a cure was out of the question, our aim should be to endeavour to prevent the onset of the disease and to treat it energetically in the early stages, so as to prevent, if possible, the advent of incurable fibroid changes. In a large percentage of cases the commencement of the disease dated back to childhood or early adult life as the result of some such ailment as measles, scarlet fever, or purulent nasal catarrh. Sepsis was, in many cases, the underlying element in the production of those pathological changes which ultimately led to the connective tissue and arthritic alterations associated with chronic catarrhal otitis media. It was almost unnecessary to recapitulate the importance and the necessity of the removal of septic tonsils and adenoids, and other forms of nasal obstruction and nasal sepsis; but what was necessary to emphasise was the necessity in cases of otitis media of keeping up, for varying periods, a careful toilet of the mucosa. The sheet anchor of treatment was unquestionably inflation by means of the bag or the Eustachian catheter, repeated as often as the particular case demanded. The greater the improvement after inflation and the longer it lasted the better was the prognosis. In order to maintain the patency of the Eustachian tube all obstructive or septic lesions of the throat, nose, and naso-pharynx had to be eliminated. Repeated examination and short courses of treatment were essential if the best results were to be obtained. An important factor in chronic middle-ear deafness was the subconscious loss of acuity of the cortical centres of hearing, and he believed these centres were capable of some amount of re-education, which should be systematised and if possible simplified.

Dr. J. Kerr Love (Glasgow) said that with a sound auditory nerve one should be able to do for a case of middle-ear deafness what the optician did for a refraction error. And yet it did not work out in practice. It was not enough to send the patient to a salesman of "aids to hearing," hoping that the latter would do something The real difficulty was that the acoustician waited upon the aurist, and the latter did not know enough of the pathology of the different types of deafness—the acoustician, of course, knew less. It was possible that because of the mixture of types of deafness the fitting of "auditory spectacles" would never be the success the lens was in the hands of the optician. But, he urged, we should not give up without further trial.

Mr. Neil MacLay (Newcastle-on-Tyne) said that people must be taught to give as much care and consideration to their ears as they gave to their eyes. Of the many remedies for chronic middle-ear deafness the most important were inflation, tympanic massage, and re-educative exercises, the last fairly claiming a certain amount of success. By employing an ordinary conversation tube, amplified if necessary by a receiver of large dimensions, the patient could read aloud to himself or be spoken to at intervals during each day.

Mr. H. Norman Barnett said that his main lines of treatment were the vaporisation of the middle ear through the Eustachian catheter with a mixture of iodine and camphor vapour, and ionisation, which was of very considerable importance in obtaining good results.

Dr. George Cathcart (London) referred to the good results he had obtained in the treatment of chronic middle-ear deafness by re-education of the hearing with the electrophonoide of Zünd-Burguet. He

attributed the improvement mainly to stimulation of the organ of Corti and of the cortical auditory centres, in addition to a certain amount of local vaso-dilatation.

Sir James Dundas-Grant was convinced that many cases escaped benefit through the imperfect introduction of the Eustachian catheter. In the intervals of catheterisation the patient could keep up the treatment for himself by the use of a self-inflator containing a few drops of diluted chloroform. Operative treatment was seldom of any value.

Mr. Herbert Tilley said that the early stages of chronic adhesive otitis were frequently overlooked, even by otologists. In the ordinary type of serous exudation into the tympanum, it was his practice to inject through the Eustachian catheter a few drops of 10 per cent. argyrol after having removed the catarrhal fluid by inflation and aspiration with a Siegle's speculum. A few cases improved with endocrine therapy.

Dr. W. S. Syme emphasised the importance of sepsis in the nose and throat; nasal accessory sinus disease was more common than was usually supposed.

Mr. Sydney Scott laid stress on Mr. MacLay's suggestion of employing the speaking-tube in the re-education of the hearing. Dental sepsis had an important relation to deafness, and an X ray examination of the teeth could not be dispensed with.

In the afternoon Mr. Norman Barnett demonstrated at the Bath Ear, Nose, and Throat Hospital a large number of cases of chronic middle-ear suppuration treated by conservative operation, and of chronic non-suppurative middle-ear deafness treated by vaporisation and ionisation.

### FRIDAY, JULY 24TH.

*Occupational Diseases of the Ear, Nose, and Throat.*

A discussion on this subject was opened by Mr. F. H. Westmacott. He said that the subject might most conveniently be discussed under two headings: (1) Industrial diseases which were included in Schedule 3 of the Workmen's Compensation Act of 1906, extended by various orders, and included in the Act of 1923; (2) industrial diseases which were met with in workers but which were not so included and might or might not cause incapacity of employment. In the first category the list of diseases affecting the ear, nose, and throat included anthrax, lead, mercury, phosphorus and arsenic poisoning or their sequelæ, poisoning by nitrous fumes, ulceration of the mucous membrane of the nose or mouth produced by dust, chromic ulceration, compressed-air illness, glanders. Among the second group were inflammation of the auricle followed by slough and necrosis, as occurred in cold-storage workers; rupture of the tympanic membrane due to explosions in mining, blasting, tunnelling, or gun-firing tests; acute or œdematous laryngitis might be directly caused by inhalation of irritant fumes of chlorine, bromine, iodine, ammonia, or sulphuric acid; membranous laryngitis, non-diphtheritic, occurred in workers in steam and irritating vapour, such as in stokers and cooks; chronic laryngitis was found among professional voice users, from misuse or faulty voice production; hypertrophic laryngitis was frequent in street hawkers, salesmen, or those exposed to dusty occupations. In continuous noises, such as riveting in boiler-making or loud machinery, which gave rise to continuous nerve strain, deafness was due not so much to damage to the sound-conducting mechanism as to destruction of the sensitive nerve-endings which constituted the sound-perceiving apparatus. More severe deafness was produced by intense sounds made up largely of overtones of high pitch than by noises of lower pitch such as were heard, e.g., in cotton mills. Tinnitus was invariable, but vertigo was only present in direct proportion to the loss of perception of the upper tone limit.

Surgeon-Commander S. W. Grimwade, R.N., said that with the exception of diseases of the ear, occupational diseases of the ear, nose, and throat were not at all common in the Royal Navy. During nearly two years' service at the R.N. Hospital, Plymouth, he had seen only four cases of labyrinth concussion from gunnery practices; all of these showed a very marked degree of deafness, which, however, was temporary, and they soon returned to normal. 99 per cent. of all cases of deafness in the navy were due to suppuration of the middle ear, and there was no question that more careful examination of recruits would eliminate a large number of these cases.

Wing-Commander D. Ranken, R.A.F.M.S., said that they found in the Royal Air Force that the effects of nasal obstruction, though disagreeable enough on the ground, were intensified in the air; the engorged nasal mucous membrane associated with high altitude frequently gave rise to insufficient ventilation and drainage of the frontal sinuses, and pilots often complained of headaches of varying duration during or immediately after descent. More important still was the presence or absence of Eustachian obstruction, for if equalisation of the pressures on either side of the ear drums by means of swallowing or auto-inflation could not be made during a rapid descent, pain and deafness together might occur, with such effects of labyrinthine disturbance as vertigo, nausea, or even fainting. There were two methods of preventing aeroplane deafness: harmful sound waves were cut off at their source by fitting silencers to the engines, and the persons exposed to noise were protected by ear protectors on the principle of a "baffle" system.

Major T. Jefferson Faulder, R.A.M.C., T.F., said that, showing the magnitude of the problem, the total number of first awards of war pensions for various aural disabilities had been 31,750; in December, 1924, this had diminished to 18,500, and approximately one-half of this total was assessed at 20 per cent. or less disablement. During the war admissions to hospital on account of ear conditions amounted to a total of 182,440, diseases of the nose 37,520, diseases of the respiratory organs other than tuberculosis 801,840, tonsillitis and sore-throat 441,040. As regards the question of ruptured drum-head, various opinions had been given, usually, in his own opinion, in the direction of over-estimation.

Mr. E. B. Waggett considered that the statistics of the recent war gave a wholly misleading impression, and he believed that the very heavy figures concerning hospital entries of chronic otorrhœa, aural, nasal, and throat operations, were to be explained on psychological rather than surgical grounds—chronic otorrhœa formed a convenient excuse for the soldier desiring a holiday at the base.

Dr. T. Ritchie Rodger (Hull) said that the sounds prevailing in boiler-making works were comparatively low in the scale, ranging round about 400 and 500 double vibrations per second. In regard to the occupational deafness of boiler-makers the mass of evidence was that the injury to the cochlea was conveyed by air-conduction, not by bone-conduction; middle-ear defects had no part in the causation. Meatal plugs of wax or vaselined wool were the only aids to prevention of the disability.

Mr. T. B. Jobson (Guildford) said that in 1915 he had had the opportunity of examining 50 German soldiers shortly after their exposure to prolonged gunfire, and about 80 per cent. of them showed diminution of acuity of hearing both for air- and bone-conduction. In from three to six months almost all of the cases had returned to normal.

In the afternoon Dr. P. Watson-Williams gave a demonstration of his method of making a complete investigation of the nasal accessory sinuses.

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## SECTION OF THERAPEUTICS.

### WEDNESDAY, JULY 22ND.

*Treatment of Asthma.*

This Section met on three days, under the presidency of Prof. R. B. Wild.

Dr. W. Langdon Brown (London), in opening a discussion on this subject, said that the treatment of asthma summarised in itself, as it were, the chief trends of modern therapy: Psychotherapy, sensitive-

ness to foreign proteins, vagotonia, and endocrine balance. Successful treatment involved them all. Asthma was due to an unstable or irritable condition of the bronchomotor and vasomotor portions of the vagus nucleus, which caused it to react unduly to psychical or peripheral stimuli, or to foreign proteins in the circulating blood. The influence of the parasympathetic nervous system was also extremely important in asthma. The asthmatic, he said, was liable to other manifestations of vagotonia. It might, however, be that the vagotonia was due to a diminished action of the antagonising sympathetic nervous system. The sympathetic nerves activated those endocrine glands which released sugar into the blood, and in asthma the blood-sugar was below normal. The secretions of glands which coöperated with the sympathetic nervous system—the adrenals, pituitary, and thyroid—were generally effective in checking a paroxysm. Further, the liability of asthma to come on during sleep, when the parasympathetic nerves had the upper hand, pointed to a disturbed balance between the two great branches of the visceral nervous system. In general terms it would appear that when the endocrine balance swayed in the direction of the vagus, asthma was likely to occur in susceptible subjects; when the balance was redressed in favour of the sympathetic system attacks might be cut short or prevented.

In considering treatment, the suggestibility of the patient should be utilised to help him to expect a cure. Sources of peripheral irritation must be eliminated, including late suppers and cold bedrooms. Specific desensitisation presented considerable difficulties both because the actual cause could not always be found by skin tests and because hypersensitiveness was not always constant for one subject but might affect a whole group. Non-specific treatment might, however, be successful. The effect of climate was well known to be capricious, but at altitudes above 4500 feet attacks were very rare. Oxygen inhalations might act in the same way as pure or filtered air. Drugs which paralysed the parasympathetic endings or stimulated the sympathetic were also helpful.

Dr. E. P. Poulton (London) said that, defining asthma as a bronchial spasm with vasomotor turgescence, there were several causes of the condition. Asthma due to bronchitis or nasal coryza should be sharply separated from the idiopathic variety or allergia. The cardiac asthma of elderly patients was also a separate entity. The allergic group included other toxic idiopathics besides asthma. Skin reactions were of no value in diagnosing the cause of asthmatic attacks, but Loewe's extract of human dandruff might be of great use in determining whether a patient belonged to the allergic or to some other type. Asthma, in his opinion, was not due to anaphylaxis any more than histamine shock was due to anaphylaxis. Treatment might be directed towards: (1) Desensitising the patient either by specific or non-specific means; (2) keeping him away from the specific exciting substance; (3) acting on the receiving mucous membrane of the nose, as by light cauterisation; (4) altering the condition of the bronchial muscle and removing spasm by subcutaneous adrenalin or caffeine or by oxygen inhalation.

Dr. P. Hamill (London) said that it was wise to take a careful history and to consult the patient as to the cause of the attack. It was generally possible in this way to get at the exciting factor. He agreed with the previous speaker that it was difficult to achieve specific immunity, but non-specific immunisation might be tried. Peptones could be given by mouth for the purpose. Cases with a *M. catarrhalis* infection benefited by autogenous vaccines; but it was necessary to start with a very small dose as the patient was highly sensitive. Many drugs could be employed. The vagus endings could be paralysed by atropine or hyoscine, the sympathetic stimulated by adrenalin and cocaine; the bronchial muscle could be relaxed by nitrites, papaverine, or benzyl benzoate. Pituitrin and adrenalin were very effective in cutting short an attack if given at the beginning. Oxygen was useful if given efficiently, and some of the patients suffered from chronic oxygen lack. It was necessary to improve the general health and resistance and treat the patient as well as the disease. Arsenic, bromides, iodides, and thyroid were all useful.

Dr. Alexander Francis (London) said that the indiscriminate use of cautery to the nose did much damage. He gently touched certain spots on the mucosa keeping a careful watch on the blood pressure meantime. This was effective in 80 per cent. of cases, excluding those with nasal polyp. Cases complicated by nasal polyps were invariably made worse if cauterised or if the polyps were removed.

Dr. A. F. Hurst (London) said that, speaking as a sufferer for 30 years from asthma, he believed there was no cure for the condition, the patient always remaining a potential asthmatic. To ward off attacks adrenalin was invaluable if properly used. It must be given at the very beginning of an attack, when 1 minim would suffice. More than 3 minims was never required at this stage. He recommended that the patient should have an injection ready by his bedside so that he could give himself the drug the moment he felt the premonitory symptoms. The injection could be repeated as often as was necessary. If these instructions were carried out the patient need never lose a night's rest, and the fatigue which rendered him liable to further bouts was avoided. In fact, the best cure for asthma was not to have attacks.

Mr. Frank Coke (London), in spite of the dicta of previous speakers, believed in the efficacy of protein tests. He classified the types of asthma. Every single case must be fully and properly tested with every protein with which the patient comes in contact. The offending proteins must be avoided. If this is impossible, as in the case of horse dander, pollen, and proteins causing occupational asthma, the patient must be desensitised.

Dr. S. D. Bhabha (London) described an apparatus for administering oxygen which had been found successful in the treatment of asthma, and the President of the Section drew attention to the relation between asthma and eczema. The two conditions sometimes alternated in the same patient.

Dr. Langdon Brown, in replying to the discussion, agreed with Dr. Poulton's use of the term allergy. He thought that the value of skin tests was general rather than specific, and that they succeeded best when the cause of the asthma was already known. In reply to Dr. Hamill, he said that in his experience the action of amyl nitrite was somewhat uncertain. He had sometimes had great success with papaverine. He agreed with Dr. Francis as to the beneficial results of light cauterisation. With regard to the President's remark on the connexion between eczema or asthma, he showed the pedigree of a family in which the two diseases had appeared alternately in the different generations.

### THURSDAY, JULY 23RD.

### *Treatment of Chronic Arthritis.*

In opening a discussion on this subject, Sir Thomas Horder (London) laid stress on the usefulness of weighing the ætiological factors in each case. Although these were frequently obscure, there was good reason for thinking that a microbic factor was invariably present. A table to show the relative importance of this factor might be constructed as follows:—

| INFECTIVE FACTOR | *Joint Disease.* |
|---|---|
| HIGH. | |
| ∧ | Gonorrhœal rheumatism. |
| | Chronic pyæmia. |
| | Arthritis due to streptococcal, pneumococcal, dysenteric, and coliform infections. |
| | Tuberculous and syphilitic arthritis. |
| | Arthritis in association with focal sepsis. |
| | "Rheumatoid" arthritis. |
| | Osteo-arthritis. |
| | Gout. |
| ∨ | |
| INFECTIVE FACTOR LOW. | Arthritis in tabes, syringo-myelia, hemiplegia, and paralysis agitans. |
| | Trauma. |

Arthritis as a definite expression of *focal sepsis* formed an intermediate group between the cases of direct joint infection and those termed "rheumatoid," which, owing to our present ignorance of the degree to which the element of infection was present, formed the crux of the therapeutic problem. In this intermediate group drainage or other appropriate treatment of the area of focal infection was the first step in treatment. More than one area was sometimes involved, in which case it was important to determine as far as possible which was primary—and attend to that first. Where teeth and tonsils, or teeth and gastro-intestinal tract, were both involved the teeth should receive attention first. The speaker discussed the rôle of the prostate, the uterus, and the alimentary tract in arthritis. Streptococci, both hæmolytic and non-hæmolytic, were probably by far the most common organisms concerned. Antigen therapy must be supplementary to drainage of the infected area and not a substitute for it. A diet which lowered the bacterial content and caused mechanical cleansing was probably more important than the use of intestinal antiseptics; but amongst these calomel and salol must not be forgotten.

In the great majority of cases, the speaker said, chronic arthritis was part of a general disease, for which the patient required treatment. The nutritional and the nervous aspects must both be carefully considered. Endocrine disturbance was frequently present, and small doses of thyroid were often helpful. The possibility of a metabolic factor, such as gout, must not be forgotten even in cases of marked infection. Protein-shock therapy gave relief in suitable cases, but the final results were not always favourable. It was definitely contra-indicated in active disease, or where there were visceral or serous membrane complications, such as pleurisy, "stagnant" cases should be chosen; and there was grave danger in teaching students to use methods which may easily be misapplied. It was sometimes said that the infectivity of most cases of chronic arthritis made the idea of spa treatment irrational; but if arthritis was a general as well as a local disease this reasoning was fallacious. There was undoubtedly as great a field for the treatment of these cases by spa measures as ever, and of radium waters and radio-active mud we were only now beginning to learn the potentialities. Sir Thomas Horder then went on to describe the local measures available. All efforts to restore and improve the function of diseased joints reacted beneficially on the general condition, and local treatment must prepare the limbs for an arrest of the disease which might occur at any moment.

Dr. Preston King (Bath) spoke on the balneological aspect of treatment of chronic arthritis. He thought that the value of spa treatment was generally acknowledged, and that the value of the Bath Spa was a very high one owing to the thermal character of its waters which rise at a temperature of 117° F. There were, of course, many factors producing beneficial reactions in patients, and the sceptical emphasised the factor of suggestion. Suggestion did play a part, but it was nothing new: it was as old as the practice of medicine itself. He referred to the different types of arthritic disease and their reaction to balneological treatment. In his experience the asthenic case of rheumatoid arthritis with rapid pulse, emaciation, sweating, and peri-articular swellings did not respond well to full bath treatments. Such cases were apt to do badly anywhere under any treatment, but tonic treatment with douching was the most suitable. Chronic arthritis in all forms was amenable to hydrotherapy. Treatment was directed to: (1) the relief of pain; (2) the removal of sources of infection; and (3) increasing the mobility and correcting the deformity of the joints.

Dr. Nathan Mutch (London) agreed with the remarks of the opener on the importance of the drainage of any area of focal sepsis which could be discovered; but the removal of foci of infection often proved a failure as regards improvement of the patient's condition. This might be because, although the original focus had been cleared out, the infection had already spread far beyond reach and escaped detection. A frequent source of infection was oral sepsis, and years after this had been eradicated, pathogenic streptococci of oral orgin might be recovered from the stools. If the bacteriological content of the bowel at different levels was studied at laparotomy, it was often found that the ileo-cæcal region was especially heavily infected, and an infection might be found above this level in the jejunum or even in the duodenum. Positive cultures might also be obtained in the lymph glands draining the bowel, indicating a widespread infection passing to the blood-stream and the lymphatics. It was not, he thought, generally realised what an enormous daily variation occurred in the bacterial content of the stools. The number of streptococci present might vary from nil up to ten times that of the *B. coli* present in different specimens, or even in different parts of the same specimen. Five to six specimens at least should be examined before giving an opinion in a difficult case. This variation should be taken into account in judging the results of drug treatments, and would also help to explain the want of uniformity in laboratory reports complained of by the opener. With regard to vaccine treatment, it was advisable before beginning this to consider the degree of toxæmia present. The reaction to vaccines varied with the activity of the toxic conditions, and this should, if possible, be reduced first. Lesions of joints and affections of the endocrine glands were often coincident. The thyroid more especially was frequently affected, and the giving of thyroid extract might assist other lines of treatment. Secondary infections and invasions often occurred. One organism might be followed by another. Joint reactions might be obtained by the injection of intestinal streptococci, when the original infection was known to have been a staphylococcus or a virulent streptococcus from the mouth. Organisms were not *the* cause of arthritis. Probably there was no one cause, and multiple causes should be looked for in all cases.

Dr. C. B. Heald (London) contributed to the discussion from the point of view of the cases as treated in an electrical department. He considered that they might be classified from their reaction to treatment as: (1) The stationary group, composed of those who are relieved of their symptoms so long as they continue under treatment and relapsing as soon as treatment is stopped; (2) the progressively improving group, which responds satisfactorily; and (3) the group that shows no reaction and is unrelieved or gets steadily worse. He found that cases were curiously selective in their reaction to electrical treatment; and as regards the form of treatment to which they responded, he was unable to distinguish clinically into which of the three groups a case would eventually fall. He thought that the reaction to treatment might vary with the basic variation of physical type. When studying variations of defective physical types in men presenting themselves for pilots in the Air Force, he had found that they might in general be placed in three classes: cardio-vascular debility, nervous debility, malnutritional debility. Before commencing treatment it was exceedingly important to take a careful history and to make a complete routine examination. Among other methods he always examined for areas of hyperalgesia by means of a small faradic current. The presence of positive zones was not diagnostic, but if they were present the patient was likely to show a bad reaction to treatment. Treatment was directed towards improving the basic condition and the local condition. For the nervous debility type of patient he used ultra-violet light with selected local treatments. For the cardio-vascular debility type he used diathermy, especially applied to the abdomen.

Mr. E. Watson-Williams (Bristol) thought that the importance of infections of the upper air passages should be realised and the sinuses carefully examined in every case. Although the gastro-intestinal tract might seem to be the primary source of an infection, this originated in many cases in the upper air tracts and the organisms

had passed downwards through the stomach at some period when the hydrochloric acid was diminished. Therefore sinus infections should be eliminated first in all cases. Neurasthenic conditions, too, might be kept up by the presence of chronic infections, and even crippled patients might be improved by the discovery and removal of a sinus infection.

Dr. E. P. Cumberbatch (London) stated that he was a believer in the value of electrical methods of treatment, and especially in the use of diathermy in the treatment of gonococcal arthritis. If there were no gross changes the use of diathermy would cure, and in any case it would give improvement. The treatment was applied to the seminal vesicles or to the cervix uteri, and needed to be very carefully directed both as to dosage and details of administration. In non-gonococcal cases in women there was frequently an infection of the cervix, with endocervicitis and erosion. The organisms obtained in such cases might be coliform organisms, diphtheroid organisms, or a *Streptococcus fæcalis*. These, too, he treated with diathermy, with the result that in many cases the arthritis was arrested, there was an improvement in the general health, and the cervix was restored to a normal appearance. He raised the cervix to a temperature of 114° F., but not exceeding 115°. He standardised the temperature by application to the urethra, which was sensitive to heat, whereas the cervix was not.

Dr. David Campbell thought that rheumatoid arthritis presented two problems—the orthopædic problem and that of the cure of the infective process. He thought that there was great danger in immobilising the joint. In cases of the infective type of rheumatoid arthritis protein-shock therapy was worth trying. He had not observed any case of pleurisy following the use of typhoid vaccine, which was the one he had used; but he had seen two patients who, having had albuminuria previous to the injection, had developed a transient hæmaturia.

The President remarked upon the curious fact that the onset of damp weather should cause changes of a sensitive nature in joints which are themselves continually bathed in fluid. It appeared that when the humidity reached a certain point the elimination of carbonic acid from the body was much diminished, and it was possible that one might find in the accumulation of carbonic acid an explanation of these obscure pains.

Dr. P. Hamill thought that whilst harm could be done by too rigid splinting, one of the first principles of treatment of acute inflammation was rest, and therefore he remained unrepentant concerning his use of splints in moderation, though exercise and massage should certainly be employed in addition.

Dr. Warren Crowe (Harrogate) said that in arthritis and non-articular rheumatism (for the two conditions could be classed together) vaccines ought to do well. Every active case of chronic arthritis under vaccine treatment, almost without exception, passed through a stage of sensitiveness to vaccine, and this was sometimes so intense that vaccines were for a time not tolerated at all. When the clinician recognised this fundamental fact his results would be very much better.

Dr. F. G. Thomson (Bath) said that much depended on the general condition of the patient. If the general condition was poor the best course was to send the patient to a spa. If the general condition was good the most valuable thing for practical purposes was to use intravenous shock.

Sir Thomas Horder, in replying, said that he had not intended by any means to impugn the value of the work of the bacteriologist. He could not get along without him, but he thought it desirable to ginger him up occasionally. He wanted to make it plain that he did not advise protein shock in the case of a patient who was improving by any other method. To come back to his main thesis, which he thought the discussion had strengthened, he held that arthritis was a general disease with local manifestations, and for that reason the patient must be studied quite as much as the joints.

## FRIDAY, JULY 24TH.

### *Therapeutic Value of Light.*

At this meeting of the Section, Prof. W E. Dixon (Cambridge) in opening the discussion, said that the subject was the therapeutic value of light. It had nothing to do with X rays or radium. The actions of light which could be easily demonstrated on animals or man were of three varieties: local, general, and specific. The local and general reactions might be produced by certain other irritants. The specific action was possessed, as far as was known, only by light. The local effect consisted of erythema, which might be followed by swelling of the skin, blisters, or even breaking down of the skin. Mustard had a similar action. The mechanism was an irritation of sensory nerves which, by means of an axon-reflex, produced dilatation of the blood-vessels in the skin or subcutaneous tissues. The proof of this was that if the nerve was cut or anæsthetised the reaction no longer occurred. For instance, if a drop of mustard solution was put into the eye of an animal, the result was acute inflammation of the conjunctiva, but if the eye had been previously anæsthetised with cocaine, inflammation did not occur. Although the mechanism could be explained, the problem was not quite so simple as it appeared. How was it that both mustard and light could stimulate nerve-endings? The stimulation was brought about in different ways. Mustard underwent hydrolysis in contact with the skin. Energy was thus liberated for the stimulation of the nerve-endings. It was not known how light excited nerve-endings without affecting other tissues, but it was probably due to the presence of fluorescent substances in the skin. If these substances were exposed to light their action was greatly enhanced. One such fluorescent substance was hæmatoporphyrin, obtained during the breakdown of hæmoglobin to bilirubin. People with excess of hæmatoporphyrin were sensitive to light. This could be proved experimentally by injecting mice with hæmatoporphyrin. When the mice were exposed to light the skin became red and swollen and the animals might die. Summer prurigo and hydroa vacciniforme were a result of excess of hæmatoporphyrin in the skin in man.

Pigmentation was another non-specific local effect. It was a protective mechanism the object of which was to absorb ultra-violet light. The general effects of light were a mild stimulation of medullary centres, slight increase of the pulse-rate, with vaso-constriction and rise in blood pressure, and stimulation of respiration. There was an increased activity of the tissues, as shown by the increased power of phagocytosis of the leucocytes. The specific effect of light was its influence on the storage of calcium and phosphate in the body. The ingestion of calcium by the mouth did not alter the percentage of the salt in the tissues any more than drinking water diluted the blood. Children could be prevented from getting rickets or cured of the disease by light. The point to discover was whether light acted on the surrounding air, on the food, or on the body. It had no effect on the air, but its effect on foodstuffs and on the body was important. Wheat, biscuits, flour, milk, eggs, lard, linseed oil, cotton-seed oil, and other substances which of themselves were incapable of influencing rickets, when irradiated assumed antirachitic properties. All these foods contained cholesterol. Cholesterol underwent changes on exposure to light. It became yellower and more translucent. This altered cholesterol had the property of preventing rickets. The skin contained a large amount of cholesterol and therefore exposure to light had the same effect as feeding with irradiated cholesterol-containing foods. Experiments on rats showed that feeding with skin had no effect in curing rickets, but the animals were cured when they were given skin which had been exposed to light. Too long exposure to light was harmful. In Sweden it had been found that certain groups of people, notably neurotic patients, were made worse by light treatment. If the observations made on cholesterol held good, there should be parallelism between the incidence of rickets

and the amount of available sunshine. There were no good statistics on this point, but the information he had did not show any such relation. In the Panama zone there was little sunshine but no rickets. In the State of New York there was more sunshine but rickets was prevalent.

Dr. C. E. M. Jones (Alton) said that clinical phenomena could not always be explained scientifically. The two diseases in which light treatment had been found most effective were rickets and tuberculosis. From the clinical point of view the general action of light was more important than the local. Heliotherapy or natural sunlight aimed at producing a feeling of exhilaration and increased well-being in the patient. Certain patients could not be exposed to light and were known as non-pigmenters. They were, as a rule, fair or sandy haired, freckled people who got burnt instead of becoming pigmented. Pigmenters had a higher resistance to non-pulmonary tuberculosis than non-pigmenters. The feeling of exhilaration after heliotherapy was accompanied by increased metabolic activity. The latter might be attributed to exposure to the air and apparently did not occur with artificial light treatment, which was carried out in a room. We were familiar with psychological action of light in increasing cheerfulness. Increase of mental activity had been observed in children treated by light. Exposure to light must be graduated, otherwise depression and collapse supervened as happened with non-pigmenters. If a child who was a non-pigmenter had bone or joint tuberculosis and the lesion became quiescent it would almost certainly relapse or the child would get a fresh lesion. If the fresh lesion was treated often pigmentation supervened, and then the disease might be cured. If the patient did not have some power of acquiring pigmentation he appeared unable to shake off the infection. The effect of air and light on muscular wasting was remarkable. In cases such as those of tuberculosis of the hip, which in hospital always presented wasting of the muscle, there was practically none with treatment by heliotherapy, although the limb was immobilised in the same way. Artificial light was useful when sunlight was not available. Here the local action was much more important, but the best effects were obtained when local was combined with general light baths. He had obtained good results in the treatment of lupus. Light treatment was contra-indicated in non-pigmenters, febrile cases, in those who were acutely ill, in amyloid disease, and in the very young or the very old.

Dr. G. H. Lancashire (Manchester) said that great advances had been made in recent years in the treatment of skin diseases. He was one of the first people in this country to use Finsen's lamp, and had obtained very good results with it in lupus. Recently at Manchester they had installed a modern artificial light apparatus which was reserved for tuberculous cases. The results, especially in lupus, had been more successful than he had dared anticipate. The patients were given a general exposure to the light with the lesion covered. The cosmetic results were very good. Healing had been obtained in cases of buccal and nasal lupus. He had seen remarkable benefit from light treatment in alopecia, but he would like to utter a warning against making too wide a claim for the method. Light therapy should be reserved for cases where it gave better results than other forms of treatment. Evidence as to its special efficacy should be published before it was recommended in any particular skin disease.

Dr. William Mitchell (Bradford) spoke of his work at the Bradford Royal Infirmary, where he had treated cases since 1906. The chief conditions for which he employed light therapy were lupus, alopecia areata, tinea, acne, and lupus erythematosus. In lupus vulgaris a preliminary dose of X rays was of advantage. Cases of tuberculosis of the spine and glands did well provided that no abscesses had formed. Their presence was a contra-indication to the treatment. In lupus erythematosus better results were generally obtained with carbon dioxide snow and ether; but in some cases light was useful. For acne he preferred filtered X rays

Dr. P. Heffernan (Buxton) asked whether any work had been done on the influence of light on iodine metabolism. Dwellers in dark and narrow valleys were liable to develop goitre due to iodine starvation. He would like to know whether sunlight had any power of fixing iodine in plants or of enabling the body tissues to make use of iodine.

Dr. J. R. Garrood (Huntingdon) suggested that the factor responsible for pigmentation or non-pigmentation might be racial. Mediterranean blood was widely prevalent in this country, and the Mediterranean type survived exposure to tuberculous infection better than the Nordic.

Dr. E. P. Cumberbatch asked to what depth the arterioles were affected as the result of an axon-reflex from stimulation of cutaneous nerves. He would also like to know whether it made any difference to the clinical results whether the patient was exposed for three minutes to a mercury lamp or for half an hour to a carbon lamp.

Dr. Newman Neild (Bristol) said that patients were apt to take the cure into their own hands with disastrous results. He had two cases of phthisis who had exposed their chest to the sun without medical advice and a bout of pyrexia had followed.

Dr. Helen Mackay (London) said that her experience had differed somewhat from that of other speakers. Neurotic children suffering from irritability did well under light treatment. They became much happier. In babies if the dose was increased too rapidly the child remained happy but stayed awake. If the dose was cut down the child immediately slept well. Moderate stimulation was good, but an overdose caused undue excitability and must be avoided. Cases of eczema benefited when light was added to local treatment. She had had good results with wasting babies, but it was extremely difficult to foretell which children were going to do well with light.

Dr. J. M. H. Munro (Bath) called attention to the analogies between tuberculosis and rheumatoid arthritis. In both treatment aimed at raising the metabolism generally. To this he attributed the good results obtained in arthritis with light therapy.

Dr. T. B. Poole (Westcliff) spoke of the benefits of calcium administration in menorrhagia and chilblains, and concluded that the drug was absorbed into the circulation.

Dr. Jones, in reply to Dr. Cumberbatch, said that he had found no difference between the two methods of exposure from the clinical standpoint; but he himself preferred the carbon lamp because it more closely resembled sunlight. He did not agree with Dr. Mitchell that abscess formation contra-indicated light treatment. He had had success in a case of tuberculous spine with abscesses. As Dr. Neild had said, there was a good deal of risk in pulmonary tuberculosis from unsuitable exposure.

*Reply.*

Prof. Dixon, in replying to the discussion, said that clinical observations could not always be explained by science. Science was only the handmaid of medicine. He agreed that pigmentation varied with the patient's resistance. Dr. Jones's observations and Dr. Garrood's explanation were both in agreement with Charles Darwin's statement that only the people who became black were able to resist certain tropical diseases and therefore they had survived. He did not know of any work on the influence of light on iodine metabolism. The question of calcium absorption had nothing to do with this discussion on light; he would only say that, unless there was calcium starvation, taking calcium by the mouth did not increase the amount in the blood, nor did it increase the clotting power of the blood. In reply to Dr. Cumberbatch, he said that the reflex from cutaneous nerves acted on the vessels in the subcutaneous tissues down to the muscles. Dr. Mackay had spoken of overdoses of light. Stimulation was always followed by depression. Unfortunately, we had at present no means of gauging the amount of light administered.

Dr. Newman Neild read a paper on the

*Uses of Posture for Bronchial Drainage.*

In order to drain the bronchi, he said, the patient must be placed in such position that the bifurcation of the trachea was lower than both bronchi. There were three practicable positions in which this result might be obtained—namely, on the back, on the face, and on the side. The best and the one most comfortable to the patient was on the side but turned a little towards either the face-down or the on-the-back positions. The patient would lie on his right side, with the head low and the waist raised with pillows, so that the highest point was under the lowest ribs. The right ear would be close to the edge of the bed so that the mouth would be over the side. The position must be maintained by suitably placed pillows. This posture was excellent when prolonged drainage was required. If only one side of the chest required drainage that side should be uppermost. Cases treated successfully by the adoption of this posture included hæmoptysis, pharyngeal paralysis, bulbar palsy, cerebral disease, and various conditions complicated by bronchitis. If dying patients were placed in this position the death rattle, which is so trying to others who are in the same ward, would cease.

# Reviews and Notices of Books.

THE MECHANISM AND GRAPHIC REGISTRATION OF THE HEART-BEAT.

Third edition. By Sir THOMAS LEWIS, M.D., F.R.S., &c. London: Shaw and Sons. 1925. Pp. 529. 50*s*.

SINCE the appearance of the last edition of this monograph the results of some important researches in cardiac physiology and therapeutics have been published in this and other countries. A mass of new evidence has been collected—a very considerable part of it in Sir Thomas Lewis's own laboratory at University College, London—and a step forward has been made in our knowledge of certain aspects of the subject. This recent work is ably summarised in the present volume. Each new hypothesis considered is submitted to the same careful and well-balanced criticism which characterised the previous edition, and when, in the author's opinion, the evidence at present available is insufficient to justify a definite conclusion, the observed facts are clearly stated, and the reader is left to form his own judgment.

One of the objects of science is to simplify knowledge by developing general hypotheses which will correlate and explain what had previously been an apparently disconnected mass of observations. In the new chapters of the present book which deal with circus movement and with the membrane theory of electrical phenomena, the reader can catch a glimpse of two mechanisms which have already shown promise of bringing together observations hitherto more or less isolated and obscure. The researches of Mines and Garrey originally suggested circus movement as the cause of fibrillation; but at the time that the second edition of "The Mechanism" went to press an alternative hypothesis received the support of the author. In the present edition five chapters are devoted to the consideration of circus movement, the refractory period, and closely allied problems; while two others deal with the possible rôle played by circus movement in the genesis of extrasystoles and paroxysmal tachycardia, and with the alternative hypothesis of parasystole. Another new chapter treats of the nature of heart-block. In addition to these major alterations and additions, much of the text has been rewritten to conform with the most recent advances in our knowledge, and many new figures have been introduced. To deal in detail with these various points is beyond the scope of a review, and it must suffice merely to enumerate as examples the sections dealing with "the law of cardiac muscle," the relation of excitation to contraction, the membrane theory of electrical changes in muscle, and the significance of aberrant ventricular complexes.

There is one aspect of the subject which might with advantage be treated more fully in a future edition—namely, the instrumental investigation and the graphic registration of heart sounds and murmurs. The various devices employed by Einthoven and his colleagues, by H. B. Williams and by Wiggers, each have certain advantages over the older method with the carbon microphone. Year by year as specialisation increases it becomes more and more difficult for the clinician to keep in touch with the growing point of knowledge. The general physician of to-day must be content to receive most of his mental nourishment in a predigested form, but for those who still prefer to masticate their own food, and are prepared to curtail the number of courses on the menu, a book such as this is invaluable. It summarises recent work, it affords an easily accessible and very complete bibliography, and last, but not least, it gives the reader the benefit of the carefully considered opinion of an expert critic.

Sir Thomas Lewis's book holds a unique position in the literature of modern cardiology.

MANUAL OF PRACTICAL X RAY WORK.

Third edition. By JOHN MUIR, B.Sc., M.B., Ch.B., Assistant Radiologist, University College Hospital. London: William Heinemann. Pp. 524. 31*s*. 6*d*.

THIS excellent manual was first published in 1908 under the joint authorship of Dr. J. Muir and Dr. D. G. Arthur. In this third edition Dr. Muir has done the re-writing and revising in collaboration with the late Sir Archibald Reid and Mr. F. J. Harlow, of Blackburn, and no doubt the help and advice received has greatly enhanced the value of the book. The gastro-intestinal section, although not unsatisfactory, seems to be its least adequate part, and here some amplification would be useful. New methods and observations on such subjects as orthodiagraphy, pyelography, gall-stones, and eventration of the diaphragm are dealt with clearly and in sufficient detail for a text-book, while a small appendix on the radiography of the pregnant uterus is added.

Of good X ray books there are few, but this one can be recommended to the practitioner with confidence, and particularly to students who are studying for a diploma in radiology. Finally, the illustrations are sufficiently numerous, good, and clear. We have one criticism. Nearly all the modern X ray text-books are devoting more and more space to technical descriptions of X ray tubes, electrical supplies and apparatus. This seems often to be a great waste of time, space, and energy on the part of the authors. In this volume, for instance, 166 pages are given up to this technical electrical description out of a total of 524 pages, and practically all the information can be got from the excellent descriptive catalogues which are nowadays published by instrument makers. It seems that the space might be more usefully employed by a medical writer.

PATHOLOGY.

*Text-book of Surgical Pathology.* By C. JENNINGS MARSHALL, M.D., F.R.C.S., Assistant Surgeon to Charing Cross Hospital; and ALFRED PINEY, M.D., M.R.C.P., Director of the Institute of Pathology, Charing Cross Hospital. London: Edward Arnold and Co. 1925. Pp. 469. 21*s*.

ONLY occasionally does it fall to the lot of the reviewer to deal with a book for the production of which it can be truthfully said there was real need. The appearance of this volume provides one of these rare occasions. While it cannot be said that the comprehension of the pathological basis of surgery

advances at such a rate as to render the older text-books on the subject obsolete, none the less changes in thought occur and the manner of looking at things alters on small points sufficient in the mass to make a text-book, unless frequently re-edited, date very perceptibly. And of the older standard text-books of surgical pathology there have been no new editions for several years.

The present volume is all that a text-book should be. The style is clear and concise; the illustrations, with the exception of some of the reproductions of X rays and the microphotographs, are excellent; the latter are as good as pictures of their class can be, but in comparison with the histological drawings they seem to demonstrate the incapacity of the camera to reproduce successfully histological sections. In the selection of their matter the authors have shown sound judgment, not only as to inclusion and exclusion, but also in the allotment of space. Their attitude towards matters still the subject of debate is particularly laudable; in all cases where diverse views are held, the authors have never hesitated to say so, and have gone to considerable pains, succinctly but with perfect fairness, to set forth all the conflicting views worthy of consideration. In one or two instances, as in the case of the alleged relationship between "intestinal stasis" and chronic mastitis, they have gone so far in their desire to be strictly impartial as to include hypotheses hardly meriting serious consideration. It is indeed on this subject of chronic mastitis that the reader looks in vain for guidance. From the two brief pages allotted to it no idea can be gained of the multiplicity of its clinical forms or histological appearances. The section on the blood is also disappointing. It does not help to clear thinking to describe "azurophile granules" as characteristic of the monocyte. It is true that the fine granules of these cells are azurophile, but they are seldom or never seen as such by the student, while the scanty but coarse azurophile granules of the large lymphocyte must be familiar to anyone who has seen a properly stained blood film. But these are relatively small points for consideration in a future edition.

The book may confidently be recommended alike to teachers and students of surgical pathology.

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*Laboratory Diagnostic Methods.* By JOHN A. KOLMER, Professor of Pathology and Bacteriology in the Graduate School of Medicine of the University of Pennsylvania; and FRED BOERNER, Associate in Bacteriology in the Graduate School. London and New York: D. Appleton and Co. 1925. Pp. 338. 10*s.* 6*d.*

THIS book stands out from others of its class because its originators have from start to finish written solely for those actually concerned with the technique of clinical laboratory diagnosis. No cognisance is taken of the indications for the use of the various procedures described, nor is there a word as to the interpretation of results. Thanks to this rigorous self-limitation, the authors have been able to include details of methods covering practically the whole field of bacteriology, chemistry, and immunology as applied to clinical diagnosis. Histological methods of diagnosis are not included. Procedures are clearly and concisely described, for the most part in a series of numbered steps, and the composition of all reagents mentioned is fully set forth. The book should therefore prove of great value to all actively engaged in laboratory work.

The value of the book to medical practitioners and students, to both of whom it is addressed, is more doubtful. The busy practitioner has little time for the minutiæ of laboratory work. To place such a book as this in the hands of students would encourage the existing tendency to regard pathology as a short cut to diagnosis instead of the fundamental stuff of medicine. For the laboratory worker, who has presumably mastered the elements of his subject, and for the laboratory assistant to whom correct technical performance is an end in itself, the work should prove invaluable. Many of the methods described have not hitherto been available in any text-book. An excellent feature is the inclusion of McFarland's nephelometric method for the standardisation of bacterial vaccines; this closely resembles that described in 1919 by Kirman and Brown, but has the advantage of greater simplicity. It would mark one step in the clearing of the tangled skein of vaccine therapy if some such method as this could gain universal acceptance. At present one man's million may be another's thousand so far as organisms are concerned. Given a standard nephelometric method, the user of a vaccine could be reasonably sure that his "million" always represented the same amount of bacterial substance, though the actual figures would remain as mythical as at present.

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PÆDIATRICS.

*Handbuch der Kinderheilkunde.* Third edition. Vol. IV. Edited by Prof. M. VON PFAUNDLER, Munich, and Prof. A. SCHLOSSMANN, Düsseldorf. Leipzig: F. C. W. Vogel. Pp. 789. M.45.

THE third edition of this well-known handbook is completed by the appearance of the fourth volume, which contains the index to the whole work. In the first part of the volume Prof. Noeggerath and Dr. A. Eckstein deal with the diseases of the urogenital tract and of the suprarenal glands, which are described in considerable detail, and preceded by a really useful account of the physiology and chemistry relevant to the subject. With the exception of a short chapter by Dr. J. Husler on bone and joint diseases, the remainder of the volume is devoted to neurology, and these chapters, by Prof. Ibrahim, Prof. Gött, Prof. Sage, and Dr. Mendelssohn, form one of the most comprehensive works which have appeared on this branch of children's disease. While they should be invaluable as a work of reference, their utility is of wider application. The chapter by Prof. Gött on functional nervous disease contains much that is original in its presentation, and should be read by all who are interested in this subject. One may regret the somewhat arbitrary division into separate chapters on organic and functional diseases (the latter including chorea, epilepsy, and mental defect) by different authors, but this does not detract from the excellence of the articles. The well-established reputation of this handbook will certainly be maintained by the new edition.

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DIETETICS.

*The Diabetic Life.* By R. D. LAWRENCE, M.D., Chemical Pathologist and Lecturer in Chemical Pathology, King's College Hospital. London: J. and A. Churchill. 1925. Pp. 161. 7*s.* 6*d.*

THIS book has been written to meet the needs of both patient and doctor. It is quite certain that if the diabetic patient wants to keep well he must know a good deal about his disease. The book is well suited for this purpose. The elements of physiology and the symptoms of the disease are set out very clearly. The necessity of making the diet as palatable as possible is clearly recognised throughout. Provided that the patient has sufficient intelligence, he can be told to arrange his diet himself according to the number of grammes of carbohydrate, protein, and fat which are allowed him. The tables originally prepared by Drs. Harrison and Lawrence are included in the book and will enable the patient to make his own calculations. For those who are less intelligent the "line ration" scheme devised by Dr. Lawrence is simple to understand and should give sufficient variety. The different aims in treatment are briefly considered, and Dr. Lawrence does not consider that it is essential to make the patient uncomfortable in order to keep the fasting value of the blood-sugar normal. The sets of rules given for the use of insulin

and for maintaining the general health are sound, and the appendix contains useful notes on food substitutes. The index is a good one.

The book should be of use to practitioner as well as patient.

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*Lexikon der Ernährungskunde.* By Dr. E. MAYERHOFER and Dr. C. PIRQUET. Vienna: Julius Springer. 1924: Lief. I. Pp. 144. Sch.3.60. 1925: Lief. II. Pp. 336. Sch.11.90.

THIS work, of which the first two sections (A to G) have appeared, represents a highly original idea carried out with remarkable thoroughness. It may be described as an encyclopædia of all that appertains directly or indirectly to the feeding of man or beast. It contains articles not only on every form of foodstuff and fodder, but on many subjects, the connexion of which with nutrition appears somewhat remote. Ants, for instance, receive notice owing to the peculiar habits of certain South American tribes: an article on apes appears for a similar reason, with some comments on the ethics of this form of diet. Short biographical notices are accorded to writers on gastronomic subjects, such as Athenæus and Bergius Benegt. In the articles on the more important forms of food special attention is given to nutritive values and methods of preparation. Some of the subjects, such as diet in fever, and the arrangement of children's diets, are intimately connected with medical practice.

This lexicon contains much that is quaint and rare, as well as much that is of practical importance to-day. It should be of use and interest to students of many subjects, more particularly to physiologists and physicians.

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*The Normal Diet.* By W. D. SANSUM, M.S., M.D., Director of the Potter Metabolic Clinic, Department of Metabolism, Santa Barbara Cottage Hospital, California. London: Henry Kimpton. 1925. Pp. 72. 6*s.* 6*d.*

THE author of this little book considers that too little attention has been paid to the bulk requirements, the mineral and water requirements, and the balancing of a diet so as to avoid acidosis, and he has dealt with these more particularly while giving a brief account of the fundamental principles concerned with caloric value, protein and vitamin contents of a normal diet. His views on bulk requirements are the most original, and he appears to hold that colitis is about the most frequent cause of abdominal discomfort which may be largely removed by correct dieting. His statements on the progress of food through the bowel are, however, not in accord with the usual teaching in this country. He states that "the food taken on any particular day furnishes the residue for the bowel movement of the third or fourth day," while Hurst has shown by means of X rays that ingested food enters the rectum within 18 hours. For the average person to secure normal bowel movements Dr. Sansum considers that two pounds of fruit and vegetables are required daily, which is certainly more than the average person normally consumes. His views on acidosis are rather curiously stated, but they do serve to bring out an original idea on the subject of what he calls "shopper's headache," which occurs in women who do a full day's shopping on an empty stomach, thereby utilising much of their own fat with a resulting acidosis.

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KLINISCHE LABORATORIUMSTECHNIK.

Second and enlarged edition. Vol. II. By Prof. Dr. THEODOR BRUGSCH and Prof. Dr. ALFRED SCHITTENHELM. Berlin: Urban and Schwarzenberg. Pp. 683–1448. G.M. 21.60.

IF this volume is intended for use in the clinical laboratory, as its title would lead one to suppose, the reader is tempted to speculate as to what kind of place a modern German clinical laboratory must be. Were only a quarter of the investigations described to be employed, this laboratory could only be worked by an amalgamation of the pure chemical, physical, biological, and mathematical departments of a very well endowed university. The "clinical laboratory techniques" include, amongst many other operations, the following: A complete account of inorganic analysis, a detailed account of ultimate organic analysis by means of both micro and macro furnaces, interferometric and refractometric observations on sera; detailed accounts of the methods of setting up the Starling heart-lung preparation. And it must be fully understood that we have not gone out of our way to quote the most abstruse sections, and that the above list is merely a small sample of the varied techniques described.

For the use of the worker in a big department embracing all branches of bio-chemistry the volume has great merits. For instance, there is a very complete account of the methods for analysing blood, fæces, urine, and tissues for metals, poisons, and drugs. The section on basal metabolism and respiratory methods is very well written, and is admirably complete. As usual, the section dealing with hydrogen-ion concentrations is far superior to that in any English book, a reproach that some of our own workers should remove. Methods of blood analysis are dealt with very thoroughly, and it is a pleasure to see Folin's methods reprinted without the misprints of his original papers. The volume contains methods for estimation of anything in everything. It is a boiled-down and condensed Abderhalden's Biochemische Handlexikon, with parts of the Arbeitsmethoden thrown in, all superimposed upon a background of Neubaem-Huppert's "Analyse des Harns."

The descriptions are good and full of detail, and an attractive feature is a series of tables, giving every factor likely to be wanted in the course of arduous biochemical research.

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STUDENTS' GUIDE TO OPERATIVE SURGERY.

By ALFRED T. BAZIN, D.S.O., M.D., Assistant Professor of Surgery and Clinical Surgery, McGill University. Montreal: Renouf Publishing Co. Pp. 126.

THIS small book is for the use of students whilst actually performing operations upon the cadaver. The descriptions of operations are made as short and succinct as possible. The author makes no pretence of having written a text-book on operative surgery, and the work will be a useful guide to undergraduates doing an operative surgery course and perhaps also to their teachers, as a chapter on the organisation of the class and a schedule of the suitable operations have been added.

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CHEMISTRY.

*A System of Physical Chemistry.* Third edition. By WILLIAM C. McC. LEWIS, M.A. R.U.I., D.Sc. Liverp., F.Inst.P., Brunner Professor of Physical Chemistry in the University of Liverpool. In three volumes. Vol. III.: Quantum Theory. London: Longmans, Green and Co. Pp. 407. 15*s.*

THE first edition of this work was published in 1916 in two volumes. In the second edition in 1919 a third volume was added. This arrangement has been adhered to in the third edition. There are nine chapters, and a series of appendices, written by Mr. James Rice, Mr. A. McKeown, and Mr. R. O. Griffith on subjects with which they are specially conversant. The first chapter deals mainly with the theory of probability. The descriptions are admirably clear, and can be followed a priori. What is more; the mathematical parts are evolved before the readers' eyes, and no stages, however simple, are jumped. There is, perhaps, one minor point for criticism. The author explains very clearly that in

ordinary mathematical probability the factor can never exceed unity. He states, in a footnote, however, that the factor for thermodynamic probability is usually a "quantity being in general a large integral number." This must confuse the beginner, since it would seem impossible to have anything surer than a certainty, which, after all, is what is meant by a probability factor of over one. The meaning of thermodynamic probability is fully described on p. 11, where the work of Boltzmann is discussed. We feel that a reference to this page would have helped the beginner. In the succeeding chapters the theories of quanta are reviewed, and a very full account is given of Planck's radiation hypothesis. The author is to be congratulated upon the clarity of his style and the clearness of his mathematical reasonings. The appendices uphold the high standard of the general text, with the result that the whole work can be described as a brilliant exposition of an intricate subject.

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*A Manual of Practical Chemistry for Public Health Students.* Second edition. By ALAN W. STEWART, D.Sc., A.I.C. London: John Bale, Sons and Danielsson, Ltd. Pp. 83. 5*s*.

THE present edition appears after a lapse of 11 years, during which time the author states that he has "gained much experience in teaching students." The truth of this statement can easily be seen from the author's clear style and excellent arrangement. The book is meant purely as a laboratory notebook of methods, and is consequently interleaved. There are six parts, the first dealing with acidimetry and alkalimetry, the second with air, and the third with water analysis. All the descriptions of techniques are complete in themselves, and, with the exception of methods of air analysis, are up to date. The author does not mention certain modern advances in gas analysis—such as Haldane's methods, or the commercial use of the katharometer. The last three sections deal with analysis of food and beverages, disinfectants, and microscopic work. A series of examination questions are appended. Although the book is so small the descriptions are adequate, and practical wisdom is manifest in the hints to students in the front of the volume. The last hint consists of the one word "think."

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PATHOLOGICAL ANATOMY.

*Pathologisch-Anatomische Sektionsmethode nach den Grundsätzen des pathologischen Institutes der Prager Deutschen Universität.* Herausgegeben von Dr. BÉLA HALPERT, mit einem Geleitwort von Prof. Dr. A. GHON, Vorstand des Institutes. Wien: Julius Springer. Pp. 48. G.M.2.

IN this book is set forth in the briefest and most succinct manner possible the mode of procedure adopted in the performance of post-mortem examinations in the pathological department of the German University at Prague. To publish this procedure, the result of experience gained at many thousand autopsies, was distinctly a bright idea on the part of the author. The perusal of his pages in which is set forth the steady and methodical march of the investigation into the remotest recesses of the cadaver will cause many a pathologist to formulate good resolutions for the future. This is a book of a type of which, to the knowledge of the reviewer, there is no example in English. Although the procedure, modelled on that of Rokitansky, is not that in general use in this country, it would stand imitation.

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PSYCHIATRY IN PRACTICE.

*La Psychiatrie en Clientèle.* By Dr. RENÉ CHARON. Paris: A. Maloine et Fils. Pp. 152.

THIS small volume, one of a series dealing with various departments of medicine under the title "Comment guérir," is more completely divested of any academic superfluities than any other similar work which has come before us. Introduced by a brief résumé of normal and abnormal psychology, it presents the whole field of insanity under broad symptomatic headings, which are subdivided in the text only to the extent necessary for preventing confusion between maladies of totally different nature and origin. Some of the effects of this policy are necessarily odd: general paralysis, for instance, is treated in the chapter on "involutive disorders" (as distinct from "evolutive," due to congenital defect), as also is dementia præcox, apparently because both are dementias, and dementia is an involutionary change in senile cases. The whole is written from a practical standpoint, with concise and frequent paragraphs on treatment. In addition to the usual section on medico-legal questions, there is considerable space devoted to the sociological aspects of "mental hygiene."

# New Inventions.

## PHILIPS "METALIX" X RAY TUBES.

ABOUT a year ago we described in these columns [1] a new piece of X ray apparatus made by the firm of Philips, of Eindhoven, Holland, which had been in use at Dr. Bronkhorst's tuberculosis sanatorium in Apeldoorn. This apparatus, the Philips "Metalix" tube, has now been placed on the British market, and was exhibited at the International Congress of Radiology held at Westminster in July of this year, where it attracted considerable attention. The virtue of this apparatus lies in the simplicity of its manipulation and in the elimination of the danger to the operator hitherto associated with the application of X rays. The apparatus, which is made in five sizes for different types of work, consists of a cylinder varying in length from 16 to 20 in., in diameter from 2¼ to 2¾ in., and in weight from 5 to 6 lb. The metal wall of the tube consists of a chromium-iron alloy capable of being readily sealed to the glass and retaining a perfect vacuum. The heat conductance of this metal is so very small that it can be made red-hot at one end without injuring the seal at the other end. An incandescent cathode filament is placed within the metal vessel which has a circular opening, at a very short distance from which an insulated electrode is mounted, serving as an anti-cathode. The electrons are drawn towards the anti-cathode through this opening. Thus a sharply-focused spot is produced, the diameter of which depends upon the size of the opening, which serves as an electron diaphragm. The X rays issue from the anti-cathode through a window at the end of the tube. The rays which do not emerge from the window are absorbed by metal protective walls of lead and brass arranged round the tube inside the chromium-iron casing; hence the tube can be used without any further protective devices. It is claimed that this type of tube, in addition to the general advantage of complete protection without external aids, also has an increased output as compared with the usual X ray tubes. The metal-encased tube has been developed in several types for various purposes, and such tubes are said to have worked perfectly satisfactorily for three years.

The "Metalix" tube was awarded the highest honours at the recent medical exhibition held in Warsaw on the occasion of the July Congress of Polish doctors.

Further particulars may be obtained from Philips Lamps, Ltd., 60, Wilson-street, Finsbury-square, London, E.C. 2.

[1] THE LANCET, 1924, ii., 562.

# THE LANCET.

*LONDON: SATURDAY, SEPTEMBER 19, 1925.*


## OPIUM AS AN INTERNATIONAL PROBLEM.

THE Opium Committee of the League of Nations recently concluded its discussion of the annual reports from various States. The notes published in THE LANCET from time to time[1] have shown how difficult is the problem with which this Committee is grappling. Since The Hague Convention of 1912 the control of the traffic in dangerous drugs has been a matter of anxious and prolonged discussion wherever nations have gathered in congress. The second League Conference held 28 sittings, and any definite results were prejudiced by the regrettable withdrawal of the American and Chinese delegates. Much difference of opinion now exists as to the value of the advances made. Prof. PERROT, a French delegate, writes with some satisfaction in the *Revue Scientifique* of July 11th, while Sir WILLIAM COLLINS in the August *Contemporary Review* doubts whether the proposed Permanent Central Board may not prove a means of procrastination rather than an agent for forward movement. The idea of this Central Board originated in the Opium Advisory Committee of the League of Nations, and was endorsed by the United States and Great Britain. Its principal business would be to gather information about the production of, and international traffic in, narcotics, and especially to watch the channels of illicit trade smuggling. It was intended by those who devised the idea of this Central Board that it should have very wide and drastic powers of inquisition and publicity, and it was to be in a position to ration raw material and manufactured narcotics among the nations, with strict reference to their needs and available supplies. In the preliminary discussions, the American, British, and certain other delegations sought to give this Board such powers, but the obstruction encountered was sufficient to whittle down the proposed powers to an authorisation, in the event of an excessive and unexplained accumulation of narcotics in any country, and a belief by the Board that this country was in danger of becoming a centre of illicit traffic, "to recommend that no further exports of the substances covered by the present Convention or any of them shall be made to the country concerned until the Board reports that it is satisfied as to the situation in that country." The Board would also be authorised to publish a report in any such situation; and the Convention also declares it to be the friendly right of any country party to the agreement to draw the attention of the Board to any matter which appears to it to require investigation.

Writing in the September number of the *World's Health*, the journal of the League of Red Cross Societies, Mr. JOHN PALMER GAVIT, who until recently was managing editor of the *New York Evening Post*, and was a close observer of the conflict of interests in the winter of 1924–25, attaches considerable importance to this Board. He hopes that the Governments concerned will ratify the Convention, but a reply in the House of Commons on June 17th last indicated that no ratifications had so far been deposited. Mr. GAVIT believes that, given the will and the necessary powers, the production of manufactured narcotics can be controlled. There is only one place where this can be done, and that is the place whence every ounce of morphine, heroin, and cocaine must emerge at the outset of its search for victims—namely, the factory. Drug factories are relatively few, and the Governments know exactly where to find them. The character of the problem has, he contends, changed greatly since international agreement was first registered in 1912. The evil is not now an exotic affair of the Far East—the eating, drinking, and smoking of raw and prepared opium are injurious enough, but they are surpassed by the present-day abuse of the derivatives of opium and other highly concentrated drugs of addiction. These, being less bulky and more easily disguised, are more profitable to smuggle. Also, they have behind them the push of the Western genius for business organisation, and the subtle effect upon conscience of absentee ownership. It is not generally realised that, since the Hague Convention and during and after the World War, the situation has developed with appalling swiftness. The old enemy, opium, in a new and immensely more venomous and devastating form, with new allies and in overwhelming quantities, has become a very real menace to civilisation. Mr. GAVIT gives some interesting and disquieting figures. It will be remembered that the Health Commission of the League of Nations, the Opium Advisory Committee, and a mixed subcommittee representing both gave an estimate showing the amount of raw opium and crude cocaine needed per capita per annum for medical and scientific use by the population of the world within reach of modern medical service. This amount was 450 mg. of raw opium and 7 mg. of cocaine. On the basis of an estimated 744,000,000 (of the world's assumed total population of 1,747,000,000) as the population represented in the phrase "medical and scientific needs," the total legitimate needs of the world work out in tons as follows: 100 for medicinal opium, 136 for morphine, 84 for codein, and 15 for heroin—a total of 335 tons. After bringing up this total to 340 tons by allowing for such of the natives of Asia and Africa as might get access to doctors, Mr. GAVIT writes: "But let us 'go the limit' and allow 450 mg. of raw opium a year for every man, woman, and child in the world. That will give us the outside total as the conceivable medical and scientific needs of the whole world of 786 tons of raw opium per year." What is the actual amount of opium produced? No one knows. But conservative estimates converge with remarkable closeness towards a total production of about 8600 tons, including 5000 tons attributed to China. In other words, less than one-tenth of the total amount of opium produced is for legitimate medical and scientific purposes. Still less is known about the output of cocaine, of which only little more than 5 tons a year would be needed for the 744,000,000 of the population of the world supposed to be within reach of modern medical service. But a clue can be given to the liberality of the supply actually available by the fact that Japan alone in 1922–23 manufactured 15,432 lb. (*Times*, August 27th). It is evident, therefore, that the production of narcotics in the world is at least ten times as great as the most extravagant estimate of its legitimate needs.

While we wait for the efficient Government control of the drugs of addiction, it is to be hoped that voluntary associations, such as the national Red Cross Societies, may take up the educational side of

[1] THE LANCET, 1925, i., 878.

the problem, teaching the public the nature and the immensity of the narcotic peril. Such a campaign would not only educate the public, but would also probably convert some of the static power of Governments into kinetic energy.

## THE METROPOLITAN ASYLUMS BOARD.[1]

THE annual report of the Metropolitan Asylums Board, which has just appeared, contains, as usual, a large amount of well-arranged information concerning the treatment of infectious diseases in the important area of its work, and it is to this section that the main attention, both of the medical profession and of the public, will be paid. The responsibilities of the Board, however—and it is sometimes forgotten—are of a much wider range than this section indicates. If we include the work in tuberculosis done by the Board under the heading of the care of infectious diseases, there still remain some six other principal directions in which services are discharged which are invaluable to the public; for the duties of the Board include the management of hospitals and institutions for children suffering from specified contagious diseases as well as for those requiring special treatment in hospitals or convalescent homes; the provision for certain classes of mental defectives and epileptics; the care of Poor-law lads in training for the sea, both for the Navy and the mercantile marine; while a certain proportion of the casual poor fall under their jurisdiction as an authority which was instituted more than half a century ago by an order of the then Poor-law Board. Arrangements have been made only this week with the Ministry of Health, under which cases of puerperal fever to be referred to the Board are to be grouped in certain hospitals for special care and study. The Board also furnishes London with ambulances. Under these headings this report makes a clear statement of work done and results obtained, and it is possible that the figures in connexion with the last-named activity will be a surprise to many, having regard to the frequent complaint that the metropolis is lacking in proper facilities for the transport of the sick. The ambulance service, by land and river, of the Board during the year in question, dealt with over 72,000 removals, an increase on the previous year of 10,000, while the distance covered in the combined journeys amounts to a total mileage of 725,000 miles, being an increase of about 40 per cent. over the mileage of the previous year. This increase is indicative of a growing practice on the part of the medical profession and the general public to employ the ambulances of the Board in lieu of less specialised means of transport for the conveyance of patients and invalids over considerable distances. This willingness to use the ambulances of the Board accentuates the fact that public comments on the dearth of ambulances in London nearly always have the same origin; they are aroused by some default in dealing with cases of accident in the street. The whole of this question has been under anxious consideration for some time, and was referred by the Minister of Health over two years ago to the Voluntary Hospitals Commission, when a conference was held on the position of ambulance services generally in the metropolitan area. The need for better organisation and supply of transport of the sick should be better met, and it is to be hoped that action is approaching.

The section dealing with infectious diseases leaves a rather mixed impression of satisfaction and the reverse, when we study the record of progressive work in the metropolis to provide for the treatment of the epidemic group. The story of scarlet fever is a cheerful one; it can be seen from the figures that the disease can now be regarded as one which is normally unlikely to end fatally, the case-mortality is considerably under half what it was 30 years ago, while the notifications are less, though the average population of the area concerned is greater by some 80,000 persons. Measles must always be a difficult disease to summarise in statistical terms, because of its sudden incidence in large epidemics and their rapid cessation. Further, the Board deals only with a proportion of the cases, as accommodation for measles is found elsewhere during the early stage of an outbreak, the demand for hospital treatment only occurring after a certain limit has been reached. Therefore an epidemic may make grave demands on the accommodation of the Board suddenly, which demand declines with proportionate rapidity. Reference to the statistical table supplied in this report will show how the help of the Board is sought with increasing urgency for brief periods, during epidemics of measles, and how promptly the need for assistance dies away. The figures for small-pox are satisfactory, the past year being the twenty-third in succession since the disease has secured any firm hold throughout the metropolitan area. A brief history of small-pox in London, so far as the activities of the Board have been concerned, is included in an appendix, and would make salutary reading at the present moment for a good many persons. The references to encephalitis lethargica are significant, and are supported by a note on the arrangements which have been secured for the treatment of cases, written by Dr. GORDON PUGH, chief medical officer of the Children's Service of the Board. The note shows that the need for institutional treatment in juvenile cases of encephalitis lethargica is great and may be increasing in urgency, having regard alike to the recent extension of the disease in London, the non-existence of facilities for dealing with the cases, and the special difficulties incidental to the mentality of patients in the later stages. During the second quarter of 1924 there was a high notification rate of the disease, 391 cases out of 611 occurring during that quarter, while it is now recognised that, quite apart from its intrinsic seriousness, apparent cure of the disease is frequently followed by obscure after-effects, developing into physical, and especially psychical, disturbances of an anxious nature. Abnormalities of conduct have been observed which might bring, and which possibly have brought, patients within the sphere of the criminal law, when their actions have been dictated by the remaining influences of the disease, and this is a state of affairs to the remedy of which attention should be directed at once.

We refer, finally, to the anxious position revealed by the figures in relation to diphtheria, whose prevalence is sometimes regarded with complacency because the antitoxin treatment, devised 30 years ago, produced such wonderfully favourable results. But steady though the progress, which can be recorded, may have been in the treatment of diphtheria, it has been too slow, for the figures show that, in London at any rate, the forces of the disease have latterly been gathering power. Compared with the septennial period 1897–1903, the septennial period 1918–1924, gives only superficially the idea of any progress at

[1] Annual Report of the Metropolitan Asylums Board, 1924–25. Pp. 364. Office of the Board. 5s.

all, and none whatever is claimed in the report. The number of notifications, though higher in the latter of these periods, is not out of proportion to the increase which has taken place in the average population, and the death-rate per cent. is in the same period only still what it was in the earlier period. But in the intermediate 14 years the notifications were much less numerous, while figures indicating the seven year rate per 1000 persons living are considerably higher for the last septennial period than for the two preceding periods. The statistics and the words of the Board alike show that the offensive power of diphtheria is increasing in greater ratio than the defence, and it would seem that we have been lulled into inactivity by the gratifying experiences which followed the introduction of the antitoxin treatment. The fact that the position to-day is infinitely better in respect of diphtheria than it was 30 years ago is a legitimate source of satisfaction. In the matter of case-mortality a steadily declining rate reached its minimum in 1924. This is the lowest figure on record and proves, if proof were wanted, that the use of antitoxin has saved untold lives. But the continuance of a high attack-rate in the metropolis calls for anxious thought. It seems to the Board that the time has come for the adoption of measures calculated to restrict more effectively than hitherto the depredations of the disease, and in this connexion the recent figures for New York City, which are quoted in the report, should be studied by those taking an active part in the maintenance of public health. All will agree with the opinion of the Board that a case has been made out for strict consideration.

## SUGAR AND ATHLETICS.

THE most entertaining function of modern scientific discovery in the departments of applied physiology, domestic science, and the like is to find out not what we ought to do, but why we do what we do. We know now—more or less—why we should eat cabbage; we know why a man cannot run a mile as fast as he can run 100 yards and cannot hope to do so; we have a rationale for loafing in the sun. We do not know why we use soap to clean ourselves with, nor how to wash woollen socks without shrinking them; science has addressed itself to these problems, but has failed to find a solution satisfying to the housewife. No serious attention appears to have been given to the problems of why no one can eat rabbit daily, and why a white silk shirt must not be dried in the open like a cotton one for fear it will go yellow. Still, much has been and more will be discovered, and we may expect in time a due recognition by the public who are curious about dietetics of the renaissance of healthiness which emerged from the discovery by the Dutch of cabbages which would stand the winter. There has been going on the annual lamentation at the lack of interest shown by the general public in the proceedings of the British Association for the Advancement of Science. The truth no doubt is in the first place that the public takes a great deal more interest in the Association than the Association thinks, while in the second place real scientific discoveries leave the public moderately unmoved, because they do not concern their familiar activities. It is very good to know about the shape and balance of the earth, or why the amœba is of a more useful size than the rhinoceros, and it is wonderful that mere men should be able to find out such things, but these discoveries do not make much obvious difference to life, and most people would prefer a solution of the sock problem. A naïve contribution to the explanation of our habits is recorded[1] by Dr. S. A. Levine and his colleagues at Harvard. They found last year that some of the runners in a Marathon (or marathon—they print the word indifferently, and it is a nice point) who were particularly exhausted showed an abnormally low blood-sugar and symptoms comparable to those of an overdose of insulin. On further analysis it appeared that exercise such as running first somewhat increases the blood-sugar, but the percentage afterwards drops back to normal, at which it remains until, in some individuals, a further fall appears about the time when they get profoundly tired. On a repetition of the race this year these observers confirmed their findings, and got some of the runners to demonstrate that eating candies was very reviving when exhaustion began to appear. It is interesting to know that physical exhaustion is associated with a low percentage of sugar in the blood, and we are led to wonder whether the same is true of the tired, sleepy state which supervenes when a maximum discharge of adrenalin enables the subject to have a really violent emotion. But the most curious thing is that neither the authors nor the subjects at Harvard seem to have been aware that the consumption of sugar in one form or another is very widely known as preventive and curative of fatigue. Those who believe that white lump sugar really is sugar and not some artifice of a deceitful manufacturer will take it in that convenient form; others pin their faith on a bull's-eye about the sixteenth hole; a long-distance cyclist will start out with a long stick of barley-sugar in his mouth, and gradually incorporate it; sugar cakes are a sine qua non at an athletic tea-party. We almost suspect that the Harvard Marathonians have been taking advice about their diet from physiologists—a very dangerous thing to do—instead of from their mothers. However well science may explain diet it is apt to choose it badly, because it neglects the accumulated sum of human prejudices in the field which interests mankind more than anything else.

## THE NEW CONCEPTION OF LEPROSY.

THE conception of leprosy as a progressive and inevitably fatal disease is one well established in popular and to a great extent also in medical opinion; but, as is pointed out in a recent article in the *Medical Journal of Australia* (July 11th, 1925), this conception is not necessarily founded on fact. Some 29 years ago Dr. G. H. Taylor, who is at present medical officer to the New South Wales Government railways, in a systematic investigation of the patients in the general wards of the Coast Hospital, New South Wales, pointed out that thickening and tenderness of the ulnar and peroneal nerves and slight anæsthesia of the parts supplied were not uncommon in individuals, in some of whom healed leprous lesions were found post mortem. Unfortunately, this work appears to have received little recognition in official quarters, while Dr. Taylor himself at that time did not recognise the grave danger to the community of such cases. The recent writings of E. Muir (THE LANCET, Jan. 24th, 1925, p. 169) certainly confirm much of Taylor's work, for he has demonstrated leprosy bacilli in many persons who do not manifest leprous lesions, and in others who appear to recover spontaneously. It therefore becomes apparent that Dr. Taylor's original conception of the disease is one of considerable historical value.

[1] S. A. Levine, Burgess Gordon, and C. L. Derrick: Some Changes in the Chemical Constituents of the Blood following a Marathon Race. Jour. Amer. Med. Assoc., 1924, lxxxii., 1778.

# Annotations.

"Ne quid nimis."

## THE NEW TUBERCULOSIS ORDERS.

STATISTICS compiled by Dr. Stanley Griffiths, of Cambridge, and other workers, both medical and veterinary, have demonstrated beyond dispute the dangers to child-life in this country from tuberculous milk, and for a long time it has been a crying disgrace that such milk should be sold without restriction. The situation will be somewhat improved from the first day of the present month onwards, for on that date an Order of the Ministry of Agriculture became law, by which the cow with the tuberculous udder (and its equally dangerous "visibly infected companion") is marked down for immediate destruction. For a long time the veterinary profession has, through the agency of the National Veterinary Association and its branches, been forwarding resolutions to the Ministry of Agriculture, the Ministry of Health, and other authoritative bodies asking that power might be given for the destruction of this very obvious source of danger, not only to its own kind, but also to man. The Animal Diseases Tuberculosis Order, 1925, illustrates well the value of coöperation between the human and the veterinary branches of medicine; the former to control the food of man and the latter to inspect and deal with its source of origin. Of the million tuberculous cows or thereabouts in Great Britain not all are used for dairy purposes, and those which are free from tubercle of the udder may not be an immediate source of danger to the milk consumer; yet at any moment the tuberculous dairy cow may become infected in its udder and pass on living tubercle bacilli in its milk. Under the terms of this Order every person having in his possession or under his charge (1) any cow which is, or appears to be, suffering from tuberculosis of the udder, indurated udder, or other chronic disease of the udder; or (2) any bovine animal which is, or appears to be, suffering from tuberculous emaciation; or (3) any bovine animal which is suffering from a chronic cough and showing definite clinical signs of tuberculosis, shall without avoidable delay give information of the fact to a constable of the police force for the area wherein the animal is, or to an inspector of the local authority, and the constable or inspector shall forthwith transmit the information to the local authority. The veterinary inspector is then empowered to order the destruction of the animal, allowing the owner a fair and mutually agreed sum as compensation. The premises are then dealt with as infected places, and the remainder of the herd also come under inspection. The main point, however, is that the cow with the tuberculous udder, and the cow which is obviously the subject of a general infection, is destroyed, instead of being, as was the case prior to the enforcement of this Act, allowed to be sold, either privately or in the open market, to disseminate her myriads of tubercle bacilli broadcast amongst her neighbours. The September issue of the *Veterinary Journal*, which is entirely devoted to public health work, contains an article by Prof. Gofton, chief veterinary officer to the City of Edinburgh, on the position of the veterinary profession in Scotland in regard to the inspection of milk and meat. Scotland has fully recognised the fact that it is the veterinary surgeon with his professional training in the diseases of animals who is the proper person to give an opinion as to when the cow and its products are suitable or otherwise for the food of man. The Public Health of Scotland Act, 1897, opened up the way for the utilisation of the veterinary surgeon in such work. The Milk and Dairies (Scotland) Act of 1914 imposed on him wider and more important duties in supervising the milk-supply, and a reinforcement of this Act, which also came into force on Sept. 1st last, gives the veterinary officer in Scotland power to order the destruction, not only of the cow with the tuberculous udder, but of any cow which is emaciated, has a chronic cough, or other symptom of severe tuberculosis.

## SANITATION PAYS.

IN the annual report of the medical officer of health of the Port of Liverpool, a note on which we publish to-day, it is observed that the rat inspector is keeping down rat harbourage about the docks, that this involves some trouble and expense, but that some of the officials "even admit that it pays." In the July number of the *Military Surgeon* is a paper by Colonel H. C. Fisher, Medical Corps, U.S. Army, about the sanitary effect on the world of the methodical medical regulation of ships passing through the Panama Canal. He notes the educational effect of the risk of quarantine on neighbouring ports and on shipmasters. The former clean up their ports, the latter ask for rat fumigation, as they have now learned the comfort of being free of rats and other vermin. He adds, "We are receiving . . . words of commendation from shipping interests for the work done . . . shipping is realising that sanitation pays." Sir Malcolm Watson [1] calculated that certain estates in Malaya, employing 29,068 coolies, saved, through malaria prevention, £114,000 in one year, almost £4 per coolie, or 2*d*. per pound, or £3 10*s*. per acre on the cost of their rubber. It was estimated in the war that every man dead or invalided home from Palestine cost the nation £1000 for treatment and replacement. We have ourselves remarked that Lord Allenby's break through in 1918 was only made possible by reason of the malaria prevention of the preceding six months, and that to prevent the expected 60,000 fever cases due that autumn among the 70,000 men of that army did, in fact, cost only £40,000 (12*s*. per man), while treatment of the 60,000 would have cost £1 apiece for quinine alone. All who practise medicine have no doubt that sanitation pays, but there is still want of more economic and statistical teaching to drive this fact home into the minds of the public and of administrators at home. It is more fully grasped in the Empire overseas. Happily, the recent Public Health Act gave local authorities in this country greatly increased power to issue propaganda on health questions.

## COLON LAVAGE.

ALTHOUGH injection of water into the bowel is an old and well-established medical practice the present technique of intestinal lavage is comparatively recent. The method known in England as the Plombières treatment was introduced by Dr. Maurice de Langenhagen about 27 years ago for the relief of muco-membranous colitis, and sprang into immediate popularity; since then, however, it has fallen into the disrepute which inevitably awaits a remedy too suddenly fashionable. Much criticism has almost led to its disuse in France; but in England the treatment retains many advocates, and is practised at Bath, Harrogate, Buxton, Llandrindod Wells, and other spas. At Harrogate, for instance, over 127,000 treatments have been given in the past ten years. Some interest will therefore be felt in the considered opinions, or "second thoughts," which Dr. de Langenhagen contributes to a symposium on Colon Lavage in the August issue of the *Archives of Medical Hydrology*. He attributes the failure of the treatment in the hands of his critics to a misunderstanding of his aims and technique. Lavage in colitis is to be regarded as essentially a *sedative* measure. The fluid is intended to act, not as an evacuant, but as an internal bath, which clears away mucus, reduces congestion at the orifices of glands, washes the mucous membrane, and reduces the excitability of nerve-endings. Any method which produces spasm or pain is inappro-

[1] Sir M. Watson: The Prevention of Malaria in the Federated Malay States, second edition, pp. 155–6. Murray. 1921.

priate. The bowel is to be "persuaded" rather than stimulated, and to this end the injections must be small and must be made very slowly and at low pressure (12–16 inches). He recommends the use of weak (hypotonic) natural mineral waters, such as those of Plombières or Bath, or of plain boiled water with or without small quantities of common salt (7 per 1000) or bicarbonate of soda in solution. Medicated injections or strong mineral waters should not be employed, as they are likely to irritate the bowel. Two consecutive injections are given at a temperature of 110°–115° F., the first being rejected by the patient and the second retained for a few minutes. A sedative thermal bath or a warm application to the abdomen follows, and the treatment is not given more frequently than once every two or three days. Dr. de Langenhagen claims a measure of success for this treatment in at least 70 per cent. of cases of colitis, and whilst admitting that a certain number of people, perhaps 6 per cent., are intolerant of rectal injections—and in such cases they must be abandoned—he disagrees with those who say that lavage leads to constipation and atony, softens the intestinal wall, and increases the flow of mucus. Given with discretion, the treatment is neither dangerous nor hurtful. Another contributor to the symposium is Sir William Willcox, who states that he has found lavage of very great value in chronic colitis, and as a supplementary treatment in systemic diseases, such as arthritis and diabetes, in which colon toxæmia is an important causal factor. It may usefully be employed in private practice, and can be given by any intelligent nurse. Further contributors, describing the methods in use at Buxton, Harrogate, Bath, Chatel-Guyon, and other places, reveal a lack of unanimity which lends force to the plea that practitioners should carefully consider what may be the presumptive signs of intestinal toxæmia which justify colon lavage; how far liquefaction of the bowel contents affects toxin absorption; which cases require sedative and which require tonic lavage; and, lastly, what is the danger in any given case of adding to the morbid impressions of a nervous patient by local treatment.

## LATHYRISM.

OF the forms of chronic poisoning with grain and vegetable food ergotism is probably the best known and most widely studied, although its occurrence, except in parts of central Europe, is something of a rarity. In certain districts in India, however, another form of grain poisoning, lathyrism, occurs with comparative frequency, and the disease has also been reported from Algiers, France, and Persia. This disorder, characterised by a spastic spinal paralysis, is usually ascribed to chronic poisoning by various kinds of common pulse, *Lathyrus sativus*, but recent research work by L. A. P. Anderson, A. Howard, and J. L. Simonsen [1] has shown in a striking manner that this is not the case. These workers had been struck with the fact that despite a popular theory associating lathyrism with an alkaloid in the seeds of *khesari*, the vernacular name for pulse, various chemical analyses of the seeds had given differing constitutions, some observers failing completely to find any poisonous bases in these seeds, while feeding experiments on animals had also given conflicting results. On further investigation it was found that the lathyrus crop was always contaminated with leguminous weeds, which were reaped and threshed with the pulse proper and the seeds of the contaminating plants very closely resemble the pulse seeds in appearance. A vetch, known as *atka*, occurring in samples of pulse from regions where lathyrism was prevalent, was particularly investigated, and it was discovered that while botanically pure *khesari* or lathyrus seeds contained no alkaloidal substances and were without any deleterious effects on animals, the reverse was the case when dealing with *atka*. Other weeds occurring in *khesari* fields proved harmless, so investigations were confined to the *atka* seeds. Chemical analysis showed that these seeds contained a substance called vicianin, closely related to amygdalin, and also a glucoside, vicin, which, on hydrolysis, yielded a sugar and a base divicine which proved to be an oxy-amino derivative of pyrimidine. Feeding experiments on ducks and monkeys were carried out, using pure *khesari* and contaminated specimens containing varying percentages of *atka*. The ducks received raw grain, both fresh and germinating, and the monkeys cooked pulse, various preparations being used to imitate the diet of the Indians. Careful control experiments were made to exclude starvation and vitamin deficiency, and the workers pronounce themselves absolutely satisfied that *atka* is the substance responsible for the production of symptoms in animals closely resembling lathyrism in humans. Divicine prepared by hydrolysis from vicin is toxic to animals in doses of from 0·4 mg. to 0·5 mg. per gramme of body-weight, and this is looked upon as the poisonous substance in *atka* responsible for the disease. It appears to be a comparatively simple matter to eliminate the contaminating weed from the lathyrus crop by a process of sowing *khesari* in lines a foot apart and removing the seedlings of *atka* in the early stages of growth. It should therefore be easy to prevent the occurrence of lathyrism in those districts where this disease has up to now been not infrequently seen.

[1] Indian Jour. Med. Research, 1925, xii., 613.

## AN AMERICAN CONVALESCENT HOME.

NEAR the city of White Plains, New York, there was established in 1915 an institution called the Winifred Burke Relief Foundation. Besides serving as a convalescent home for those discharged from hospitals, it was designed by the founder "for the relief of worthy men and women who, notwithstanding their willingness to support themselves, have become wholly or partly unable to do so by reason of sickness or misfortune." An account of the Foundation and its work has been published in THE LANCET,[1] and in the sixth report,[2] which has now been issued, there may be detected an undiminished ardour not wholly obscured to English ears by an unfamiliar vocabulary. The centre of the work is the home itself. It comprises 11 buildings standing in 60 acres of ground, and containing about 300 beds, which are divided amongst men, women, and the adolescent. The vast majority of the patients come from hospitals and dispensaries, but others are sent by private doctors, employers, and friends. A convalescent home of this kind, according to the report, "is an institution in the country which receives post-ill and preventive ambulant patients on medical diagnosis, and gives a short rest-exercise physical-mental upbuilding with nurse-medical care, sufficient to return them to normal or substandard life activities." This definition indicates one of the features which makes this home especially interesting. It aims at prevention as well as cure, and the directors believe that the pre-tuberculous, early cardiac cases, and many of those suffering from the milder grades of mental disorder and neurasthenia should be treated in such institutions. Twenty-five per cent. of the cases are chronic; but this is not considered good reason why they should be deprived of what benefit they can get. Convalescent homes on these lines are regarded by the Foundation as one of the most urgent medical needs of the United States, and it is suggested that they will solve a large number of problems. What, then, is the treatment at this model institution? "Homelikeness is not sought . . . a measure of frank institutionalism, with its democracy and anti-neurotic momentum, gives superior results." The individual is saved from his friends; "doctoring

[1] THE LANCET, 1923, ii., 491.

[2] The Winifred Masterson Burke Relief Foundation, White Plains, N.Y., U.S.A.

and doctor-thinking" are discouraged, and the attendants devote themselves to "courage therapy." Carefully prescribed games are interspersed with rest, and as the patients improve they undertake work in the garden or workshops, again according to prescription. They have to do none of the housework, and in this the institution compares favourably with some English convalescent homes, where tired mothers find a duller repetition of their home duties. In a word, it is clear that the success or failure of such a home depends not so much on organisation as on atmosphere. If indeed the heterogeneous patients "return to the surgeon and the social adjuster erect, colourful, courageous, crutch and whim-free persons," then the triumph is a personal triumph for the members of the staff. To read statistics of admission to this institution is to gain some idea of the number of foreigners in New York, and it is impossible not to sympathise with the ambition to make these largely undesirable elements fusible. In a convalescent home there exist golden opportunities to instil American ideals, and these are not missed at White Plains. But apart from this the Foundation is an interesting experiment, and is designed to solve problems which are English as well as American.

## SCANDINAVIAN VIEWS ON RENAL TUBERCULOSIS.

IN 1923, at the fourteenth meeting of the Scandinavian Surgical Society, it was decided that in the interval between this meeting and the next, to be held in the summer of 1925, Scandinavian surgeons should collect their cases of renal tuberculosis and should provide a digest thereof for discussion at the fifteenth meeting. A scheme was drawn up, so that the same data should be provided by the different Scandinavian countries, and while Prof. P. Bull undertook to collect the cases from Norway, Prof. Rovsing was responsible for Denmark, Prof. G. Ekehorn for Sweden, and Prof. Runeberg for Finland. In a communication we have received from Prof. Bull we learn that the fifteenth meeting took place between June 25th and 27th of this year in Copenhagen. The papers which were read on this occasion (some of which he has kindly sent us) give a very favourable impression of the value of this system of pooling the experiences of a great number of surgeons who have been given plenty of time to collect and study their material. Prof. Bull's Norwegian material consisted of 580 cases collected by 21 surgeons; Prof. Rovsing's Danish cases numbered 632, provided by 31 different hospitals; Prof. Ekehorn's Swedish cases numbered 1498, reported from 22 different hospitals, and Prof. Runeberg's Finnish cases numbered 213, all of which hailed from Helsingfors. It is interesting to note how uniform is the experience of practically every surgeon in Scandinavia with regard to certain features of tuberculosis of the urinary tract. It would seem, for example, that in every Scandinavian country this is a disease which is confined to the third and fourth decades of life in most cases. In Prof. Bull's material, for instance, 74·7 per cent. of all the cases were observed in this age-period, and much the same observation was made in the other Scandinavian countries. His ratio of males to females was as 59 to 41, while the corresponding ratio for the Swedish cases was as 57·6 to 42·4. Prof. Bull found that 40 per cent. of his male patients suffered from tuberculosis of the reproductive system, but, curiously enough, this complication of the tuberculosis of the urinary tract did not greatly impair the prognosis. With regard to the complications of nephrectomy, he found infection of the operation wound, which occurred in 27 per cent., the most important, and he emphasises the seriousness of any step which, when taken during the operation, is calculated to infect the wound with tubercle bacilli. Recovery could be claimed for 51·6 per cent. of his cases in which nephrectomy was performed. We have in these lines given but the scantiest of summaries of these important papers, the contents of which might justly be called encyclopædic. It is to be hoped that means will be found to provide a translation of them into English, French, or German, so that the information they contain need not be limited to the countries of their origin.

## THE RÔLE OF THE BLOOD PLATELET.

CONCERNING the source, nature, and function of the blood platelet many theories have been put forward. It has been suggested that it is an entirely independent cell, the function of which is at present almost unknown (Achard, Morawitz, Deetjen, Aynaud, and others); that it is the primordial or embryonal stage of the red corpuscle, a view maintained by Hayem and his followers; or that it is a simple corpuscular element or rudimentary cell—one, however, which plays an important part in the coagulation of the blood, the retraction of the clot, and, as some recent researches seem to show, in the processes concerned with immunity. Again, it may be only a fragmentary protoplasmic residuum of other blood elements, or perhaps a pure artefact which has no existence in the circulating blood. In the course of a thesis[1] published at Rio de Janeiro, Dr. Arnaldo Cavalcanti Marques reviews each of these theories and unhesitatingly rejects the last. After considering the physico-chemical properties, physiological functions, and probable source of the platelets, he discusses their relation to various pathological states, including internal parasitic affections, suppuration, protozoal infections, affections of the blood and blood-forming organs, and shock conditions. The following statement on variations in the platelet count due to certain morbid conditions is given as representing conclusions with which most observers would agree, and which are confirmed by Dr. Marques's own work. An excess of platelets is present in the blood (hyperglobulinæmia) in intestinal verminoses, suppurations, recovery from loss of blood (after a certain lapse of time from the loss), convalescence from acute illnesses, and in the course of chronic disease. The reverse condition (hypoglobulinæmia) is found in the acute stage of hæmorrhagic purpura, in pernicious anæmia, and in the active period of enteric fever. Dr. Marques considers, however, that globulinometry, or platelet counting, is at present of little value in diagnosis or prognosis. None of the methods used for the count (Hayem, Aynaud, Fusari, Giudiceandrea) are free from the liability to serious error, though those of Hayem and Aynaud, singly or combined, furnish approximate results accurate enough for clinical use. He is convinced that the blood platelet plays a very important part in therapeutics.

## NEW YORK ACADEMY OF MEDICINE.

THE Academy of Medicine, which is about to move into a new building in Fifth Avenue, was founded in 1846. Since that time it has fulfilled its original objects by holding regular meetings, by maintaining a large library, and by interesting itself in public health problems. At first the Academy was homeless and used for its gatherings the premises of other medical institutions, but in 1875 it bought a house of its own, and in 1890 moved into its present quarters. It has now 12 sections which meet for discussions or to hear papers by distinguished visitors, and its increasing membership and activities long ago made it evident that the present buildings were inadequate. The library, which is the only public medical library in New York and contains over 140,000 books, cannot expand as it should, and its reorganisation has had to be deferred until new premises are found. This state of affairs attracted the attention of the Carnegie Corporation and the Rockefeller Foundation. They appreciated the potentialities of the Academy as an educational centre and decided to devote large sums to its

[1] Sobre o globulino e sua importancia em clinica (concerning the blood platelet and its clinical importance). By Dr. Arnaldo Cavalcanti Marques. Rio de Janeiro: Typ. Revista dos Tribunaes. 1924. Pp. 164 and 3 plates.

development. About £300,000 has been given by the Carnegie Corporation for building purposes, and the Rockefeller Foundation has contributed towards the endowment fund of £500,000. These gifts are conditional, however, on an expansion of activities on rather new lines. A full-time director of the Academy's work has been appointed; the library service is to be developed, and a bureau of clinical information under the direction of a committee on public education is to be set up. Public health work at the Academy has hitherto been in charge of a committee which has made important studies in communicable diseases, quarantine, hospitals, dispensaries, day nurseries, convalescent homes, and the problems of chronic disease. That this side of the Academy's work will not be neglected is evident from the appointment as first director of Dr. Linsey R. Williams, who was Deputy Commissioner of Health for the State of New York, and for three years was at the head of the Rockefeller Commission on Tuberculosis in France. Associated with him in the reorganisation and management of the Academy will be Colonel Frederick P. Reynolds, M.D., the head of the Committee on Public Health, and Dr. E. H. Lewininski Corwin who has for some time been connected with the library. From the British point of view one of the most interesting features of the reorganisation is the proposed clinical information bureau, which is to publish a monthly bulletin. In travelling to or from Europe, American and foreign doctors generally pass through New York, and the bureau is to be a clearing house of information on every kind of medical study available in the States, and also on the facilities existing in Europe. New York itself, with its huge foreign population, is a big field for study and research, and it is felt that by coördination and information this field can be made to yield a far larger harvest. The Academy intends to supply efficient machinery.

## IODINE AND ENDEMIC GOITRE.

THE successful results obtained in different parts of the world in the treatment of endemic goitre by means of iodine are known, but the ætiology of the disease is not completely cleared up, and it seems to be going too far, as some authors have done, to say that a geographical deficiency of iodine in the air, food, or water is the specific cause of endemic goitre. The more information which can be obtained from different situations as to the distribution of this disease and the relation between this and iodine deficiency, the easier it will become to prove or disprove such a sweeping statement. Prof. D. B. Blacklock has now reported his observations on the occurrence of endemic goitre in Sierra Leone.[1] He endeavoured to put to the test the theory of a geographical distribution in relation to goitre by tracing the Bagwe river up to its sources in the mountains. Goitre occurs endemically over the area drained by this river, and it was expected that since a natural deficiency in iodine in the soil and water would probably be greater at higher levels, a definite increase in the incidence of goitre would be found in these upper regions. The whole expedition occupied three months and had to be done on foot, and so frequently was a village hut the only accommodation at the various stopping places that there was ample opportunity for observing the sanitary conditions of the population at close quarters. The total number of cases examined for goitre amounted to 2465, which included inhabitants of 37 villages. The incidence of goitre amounted to 10 per cent. among the males and 23 per cent. among the females examined. From the geographical point of view the results were interesting. At lower levels along the course of the river goitre was found to be prevalent, while it was absent at the highest villages; but the whole distribution was so irregular that it became necessary to search for some other factor in its causation. It was discovered that in certain villages pollution of the water by excreta occurred to a much higher degree than in others, and this marked pollution was associated with the highest goitre rates. Prof. Blacklock points out that mere deficiency of iodine in an otherwise unimpeachable water-supply does, no doubt, account for the occurrence of endemic goitre in certain areas, as in many parts of America, but at the same time he emphasises the fact that such iodine deficiency may, in other countries, be artificially produced by contamination. He suggests that the fæces which pollute the water-supply in the district he was investigating may fix or deviate the iodine in some way, or, alternatively, that "fæcal substances or substances formed from fæces by bacteria in the water before ingestion are absorbed and alter the metabolism in such a way as to increase the iodine requirement," thus producing a relative deficiency of this element. As Sir George Newman said in his recent survey of public health, the question of causation is at least a two-sided one, deficiency of iodine intake on the one hand and an abnormal condition preventing its proper assimilation on the other.

Although these and similar hypotheses have been suggested by many workers, it must be borne in mind there is little experimental proof to base conclusions upon. It has been shown that inorganic iodine is readily absorbed into the circulation, and is stored in the thyroid, mainly in the form of organic iodine compounds. However attractive these theories may be, they must be regarded with suspicion until definite chemical and experimental evidence is adduced to support them. It is important that a careful study of all suspected waters with a regard to their iodine content be made before any conclusions can be reached on this question. This has already been extensively investigated in America, but it also requires to be done in regions where the pollution factor is more prevalent. Dolbey and Omar have shown[2] that in certain of the Nile villages where pollution is present to a marked degree goitre is prevalent, although the iodine content of Nile water is higher than that of the metropolitan water-supply of London. It would appear that in Sierra Leone also the prevention of endemic goitre is more closely bound up with sanitation than with the administration of iodine.

The investigation of the distribution of endemic goitre in America is gradually being extended to cover most of the country, and a report[3] has been published on the occurrence of this disease in Colorado. Various surveys have been made from time to time in this State in approximately 57 localities, and on the whole the prevalence of goitre appeared to be greater in the western part of the State, where drinking water is obtained from mountain streams and not from wells as in the eastern districts. No information as to the iodine content of the different waters is, however, available, and in the report it is stated that "it is problematical whether the source of the drinking water has any considerable bearing upon the occurrence of endemic goitre in Colorado, except in so far as the water may be deficient in iodine." The combined results of four different surveys in Colorado, in which nearly 4000 boys and over 13,000 girls were examined, showed that 25·6 per cent. of the boys and 30·4 per cent. of the girls had some degree of thyroid enlargement. These results show a much smaller difference between the prevalence rates for boys and girls than in other parts of the country. For the moment the usual methods of iodine prophylaxis and treatment are to be instituted, but a more intensive survey of the State is suggested to discover the nature of the iodine deficiencies in different localities and their relation to the prevalence of goitre. All such information is of the greatest importance if the problem of the ætiology of endemic goitre is to be solved in as satisfactory a manner as the problem of its prevention appears to have been.

[1] Proc. Royal Soc. Trop. Med., xviii., No. 8, 395.

[2] Dolbey and Omar: THE LANCET, 1924, ii., 649.

[3] Public Health Reports, Washington, Jan. 2nd, 1925, No. 1, vol. xl.

## A SCHEME OF MIDDLE-CLASS INSURANCE.

A SCHEME of insurance has just been proposed which is likely to reduce the anxieties of illness for the middle-class family. There is no need again to point out that there is a most important class of the community which has in sickness neither the support of riches nor of the State. It is sufficiently obvious. Practically all the contributory hospital schemes restrict their benefits to those of fairly small income, and as the costs of more complicated medical methods grow larger they form an increasingly formidable sword of Damocles which in suspension whitens the hair and in falling may wreck the home. To insure each member of a family singly against the possibility of disease, in such a way as to cover all medical fees and nursing, is practically impossible for the average man with a small income. Moreover, although a person insured for £6 per week—at a premium of perhaps £6 per annum—may be entitled to claim £30 for disablement by an illness requiring operative treatment, the expense of the operation itself may be as much as £100–£200. The Family Medical Services, Ltd., has issued at Manchester a scheme intended to appeal to middle-class householders who have felt this difficulty. The proposers have the support and advice of Sir William Milligan, and the Association itself has no interest financially in the results of the insurance, which is necessarily speculative in an untried field like this. The policies are underwritten at Lloyd's, so that the security is unimpeachable, and, in contrast to those of some mutual associations which pay benefit only if funds permit, the policies of the Family Medical Services will be definite contracts. Two schemes are issued, the first of which covers only general practitioners' fees, and the second covers, in addition, specialists' fees and operation expenses. It is an essential feature of the scheme that the interests of the underwriters and the insured should be identical, so that the first few pounds paid out in fees, and one-fifth of the operation costs, are borne by the latter. All members of a family residing at home who are eligible must be offered for insurance, and the premiums charged vary, of course, with the number in the family and with the scale of fees and operation charges insured against. No insurance is accepted at any age over 50 at entry, and no child is included of less than 2 years old. At other ages below 12 and above 40 the premiums are larger, and there are certain excepted illnesses including those not common to both sexes; but these are merely the reservations. The benefits are undoubted. The rates charged mean that the average man can secure the services of his own general practitioner, subject to certain conditions, at from 3½*d.* to 9½*d.* a week per member of his family, and can cover four-fifths of the expenses of possible operations for a further 3*d.* to 9*d.* a week. The cost of the minor yet expensive surgery which corrects smaller defects in children, and is not so much vital as advisable, will also be defrayed under this scheme, and this will probably cause the householder to look less gloomily on such interference. The issue of such policies, indeed, seems calculated to lighten a real burden. No medical examination is required, and it is only to be hoped that the terms are not so generous that they will have to be modified.

## PRESERVATIVES IN FOODS.

THE opponents of the new Ministry of Health Regulations, prohibiting the use of all preservatives except two specified chemicals under rigidly defined conditions, are still dissatisfied and are not only carrying out an active campaign in some of our daily papers, but are proposing to take up the question in Parliament and endeavour to obtain a modification of these regulations. In particular, persistent efforts are being made to represent the boron group of preservatives as both harmless and necessary—like the domestic cat. The subject is of great practical importance, so we make no apology for returning to it and considering the grounds upon which it is suggested the regulations should be modified. These seem to be three in number: that there is inadequate evidence that the boron preservatives are prejudicial; that their elimination will send up the price of many foods in which they are now used; and that their suppression will cause a great increase in "food poisoning."

As regards the harmfulness of boric acid and its salts, there is a respectable body of evidence that when they are present in considerable quantity harm may result from their consumption, and the Departmental Committee on the Use of Preservatives, after carefully considering the evidence, came to a definite opinion on the subject. It is really beside the point to assert that the small quantities necessary for preservation have not been shown to be harmful, since experience has shown that these limits are not maintained, and when the salts are widely used they may be consumed almost daily in a number of articles, thus giving a considerable dose of a substance which is comparatively slowly excreted. The real point at issue, however, is that the use of preservatives is a substitute for cleanliness, and that their addition allows food to be collected, prepared, or stored under conditions which are prejudicial to health. The methods used are only practicable because the added preservative prevents the food decomposing, as it otherwise would under these unhygienic conditions. Their immediate suppression would no doubt dislocate trade and so cause a temporary rise in prices, but this point has not been overlooked in the regulations, which do not come into force immediately, not, in fact, until 1927. Scientific investigators are unanimous that cold storage is a preservative greatly superior to added chemicals and that it can with advantage to public health replace them. There is no trustworthy evidence that such a change will cause a general increase in cost, although certain special types of food may be affected.

The suggestion that the suppression of preservatives will cause an increase of food poisoning is hard to understand, for there does not appear to be a single argument to support it. Presumably the idea is that without preservatives more food will be eaten in a tainted condition, since there will be so much more food of this character thrown upon the market. The use of cleanliness and cold storage instead of chemical additions will probably diminish the quantity of food showing early decomposition changes, since the general effect will be a much higher standard of purity. This view shows a singular lack of appreciation of the cause of food poisoning, which has nothing whatever to do with tainted food, but is a definite infection of the food with specific bacilli belonging to the Salmonella and other groups. There is no evidence that boric acid or other chemical preservative has a selective action on these bacilli and will prevent this development, except in so far as their general action is antiseptic. On the other hand, the prevailing factor in the causation of these outbreaks is a defective standard of cleanliness and care of the food which has allowed the specific bacilli to gain access to it and contaminate it. A heightened standard of cleanliness is one of our most important preventive measures.

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THE Royal Society of Medicine will hold its first social evening of the session at 1, Wimpole-street, London, W. 1, on Tuesday, Oct. 27th.

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MALTON: A HOSPITAL FOR 66 PARISHES.—For the last 20 years the little town of Malton, in the North Riding, has possessed an inadequate cottage hospital housed in a converted private residence. A new building is now about to be erected upon an elevated site given by Earl Fitzwilliam, with larger accommodation and better facilities for dealing with the cases that come in from the 66 parishes in the district of which Malton is the centre, many of which at present have to be sent to Leeds. The new Malton, Norton and District Cottage Hospital will have a large operating theatre with the necessary annexes and an X ray room.

# Modern Technique in Treatment.

*A Series of Special Articles, contributed by invitation, on the Treatment of Medical and Surgical Conditions.*

## CXXXIX.—THE SURGICAL TREATMENT OF EXOPHTHALMIC GOITRE.

### PART I.—THE DECISION TO OPERATE.

IN dealing with a patient suffering from exophthalmic goitre or other form of hyperthyroidism, the practitioner will always have in mind the general plan of treatment set forth by Prof. G. R. Murray in this series in THE LANCET of August 11th, 1923, and by Sir Hector Mackenzie [1] and Sir William Hale-White.[2] Elimination of septic foci, rest, diet, drugs, X ray and radium treatment, each has its appropriate place, and in the majority of cases does the patient some good. For those patients who respond well to these measures the question of surgical treatment does not occur. Various reasons may, however, be present to cause the question of operation to be raised, and Prof. Murray has indicated them shortly in his concluding paragraph (p. 293).

A discussion of these reasons and of the methods by which the desired result may be achieved with the minimum risk to the patient will form the subject of this article. It is to be understood that the procedures indicated are only to be entertained when therapeutic measures have not been successful; or when, for other reasons, it is deemed inadvisable to delay.

#### *At what Stage to Operate.*

At what stage of the disease, then, should operation be performed? The chief consideration will be the fact that the patient is not improving—or is actually losing ground—at the end of a period of treatment, the length of which must vary according to the social position or the family responsibilities of the individual. No actual time limit can be laid down, though it is certain that operation is very rarely called for within the first six months of the disease. There is, however, a limit to the time during which a heart can endure the constant toxicity without failing in some respect, and when the failure begins it is usually progressive; also exophthalmos may become so extreme that its ultimate disappearance is unlikely, or it may lead to corneal ulceration; or, again, the restlessness associated with the disease may appear to be progressing towards mental instability. If conditions such as these are present when a patient first comes under the care of a practitioner, it is a matter for consideration whether there should be any delay in operating except such as is necessary for thorough investigation. Mental instability may even indicate that the time for operation has passed. If the surgeon can coöperate with a physician interested in these cases, some degree of heart failure should not be a bar to surgical intervention, for there is the certainty of great amelioration in the condition of the patient. The occurrence of corneal ulceration, due to extreme proptosis, should determine early surgical intervention, surgeon and ophthalmologist working intimately together.

The social position and family responsibilities of a patient will greatly influence a practitioner. When complications such as those indicated above threaten or are present, surgical treatment becomes imperative whatever the social position of the patient, but if the individual can afford to, and will, rest completely, there is less risk of visceral degeneration than in one who must work for a living or support a family. The time for operating on these patients can be chosen when they become weary of ill-health, or when the practitioner realises that enough time has been given to non-surgical treatment. With the poor patient the case is different. Even here operation should not be unduly hurried, but women earning their own living and working-class mothers or fathers of families can rarely rest at home, and there are not enough hospital beds available to give all of these patients continuous rest and nursing for a sufficiently long period. It is to be remembered that it is usually a matter of years and not of months. Furthermore, it is a fact that, because of this lack of facilities for rest, these patients lose ground more quickly, drift around from one out-patient department to another, with occasional periods of rest in hospital, and are not only unable to support themselves or their families, but become permanently ill. The economic factor, therefore, determines surgical treatment earlier in the less well-to-do classes of the community. A review of these factors will, in most cases, leave no doubt in a practitioner's mind when, in the patient's interest, the time has come to consider surgical intervention.

#### *Special Operation Risks.*

Such patients present some special operative risks not present in the average surgical case. The symptoms of the disease become incompatible with life if they are allowed to increase beyond a certain degree. Operation undoubtedly augments all of these, at least, temporarily. The knowledge that operation is impending, and the preparation for it, stimulate the activity of the gland, apart from the actual handling of it during operation. This cause was recently responsible for the sudden death of a young patient in the throat department of a hospital while she was waiting for her tonsils to be removed. Extreme mental unrest is a dangerous symptom. Glycosuria is not infrequently present and its type must be determined. If it can be, and is, controlled, it is not a contra-indication to operation, but if it cannot be checked operation should only be performed after careful weighing of the factors. No operation should be performed while the slightest catarrhal condition of the respiratory system is present, because the handling of the region of the laryngeal nerves and the trachea stimulates secretion and interferes with its efficient expulsion, and if catarrh has been present before operation much inconvenience and some danger result. A high basal metabolic rate, and a pulse-rate persisting at or above 130 per minute while a patient is in bed would indicate that operation should be postponed. These conditions can often be controlled temporarily, but sufficiently, to render operation safe (vide infra). Walton [3] has drawn attention to a fact recognised by all concerned—viz., that patients are decidedly more unhappy in warm weather. This is due to the fact that the skin is always hot and moist, and so heat cannot be eliminated rapidly enough for comfort or safety. Therefore no operation should be performed during a hot spell. C. Mayo has pointed out that it is not an emergency operation, and patients should always await the most suitable time. Lastly, loss of cardiac compensation brings its own dangers, and patients in this condition should only be handled surgically in coöperation with a physician who is accustomed to deal with this type of case, and whose judgment can be relied upon to determine what can and what cannot be done.

#### *Preparation for Operation.*

In spite of the general agreement that operation is only to be considered after efficient medical treatment has been carried out, it is essential—in the light of constant personal experience—to re-state the imperative necessity of attention to teeth and tonsils before operation. The frequency with which patients come for operation with large septic tonsils or septic teeth still present shows that the importance of buccal hygiene is not yet sufficiently appreciated by practitioners as being one of the chief factors in medical treatment.

A patient should be prepared to spend at least seven or ten days in bed before operation. During the first two days the pulse-rate is recorded while the

[1] Mackenzie, Sir Hector: System of Medicine, Allbutt and Rolleston, vol. iv., part 1, 1908, pp. 383, 384.
[2] Hale-White, Sir William: Proceedings of the Royal Society of Medicine, Surgical Section, 1912, v., 81.
[3] Walton, A. J.: THE LANCET, 1923, i., 53.

patient is kept at complete rest, but without medication. This shows the drop that occurs as the result of rest and freedom from outside worries. Physical examination, measurement of basal metabolic rate, and urinalysis are carried out. Then iodine medication is given (Plummer,[4] Mellanby,[5] Fraser[6]), Lugol's solution, ℥ x., once a day being sufficient; often too much is given. The resulting drop in the pulse-rate and in the basal metabolic rate is definite, and reaches its maximum in about a week, and the excitability of the patient is usually decreased. The vascularity of the gland and the danger of operation are also reduced, so that the operative death-rate has been brought down from about 4 per cent. to nearer 1 per cent. in the hands of surgeons accustomed to operate upon cases of average severity. This does not mean that a severe case of Graves's disease, or an ordinary case which has undergone an exacerbation of the condition, may be given iodine treatment for a week and then operated upon with impunity; but it is a fact that some patients, who have not responded to rest and the drugs commonly used, do improve in a remarkable manner with small doses of iodine, and have been rendered fit for operation. Iodine must not be given unless the patient is in bed. Larger doses do harm, and no good purpose is served by continued administration. During these ten days of preparation the surgeon is gaining the confidence of his patient.

T. P. DUNHILL, C.M.G., M.D. Melb.,
Assistant Director, Surgical Professorial Unit, and Assistant Surgeon to St. Bartholomew's Hospital.

(*To be concluded.*)

# Special Articles.

## PROCEEDINGS OF THE ROYAL COMMISSION ON NATIONAL HEALTH INSURANCE.*

(*Continued from p. 520.*)

### VIEWS OF TRADE-UNIONS.

(App. XCII. and Q. 21828–22183.)

EVIDENCE was submitted on behalf of the National Association of Trade Union Approved Societies by Mr. F. Kershaw, Mr. E. Corbey, Mr. G. W. Canter, and Mr. G. P. Blizard.

This Association has an aggregate membership of 1,162,130 insured persons. With regard to the working of the Approved Society system it was stated that 12 years' administration of the Act has led to the conclusion that the "fraternal" factor is a diminishing quantity where it does exist, and that it does not exist at all in the case of vast numbers of insured persons. Further—

> Under the present system the "unhealthy" society cannot provide additional benefits, while the "healthy" society can be made still more healthy by the treatment benefits provided through its surplus, which in their turn will produce still greater surpluses in future years.

As to medical benefit, the view of the Association is that while the panel doctors have, as a whole, rendered competent and conscientious service, the limitation of the range of service constitutes a grave defect, and that—

> The term "medical benefit" should mean everything that medical and surgical science can command for the prevention or cure of sickness, or, in terms of the individual, everything which the medical profession considers necessary in order to restore a sick person to health.

Medical benefit should also be extended to wives and dependants and the cost of the enlarged service met by contributions, as at present, and by grants from the local authorities, and also by economies to be effected through coördination.

If a valuable medical service were provided, the Trade Union Approved Societies were not afraid to go to their members for essential contributions.

> (Q. 22048.) Do you think that under the present conditions of unemployment and depression in industry, and having regard to the new contributions and grant charges proposed under the Widows, Orphans and Old Age Pensions Bill, an increase in the charges for the Health Insurance Scheme is justifiable?—We note that the question, before it was amended to incorporate pensions, has been put to many previous witnesses. Our reply at the time our evidence was decided upon would have been: Give us value for money and we are not afraid of the decision of our members.

It was not unreasonable to assume that if the trade-unions had recommended an increase of 8*d.* in the contributions—the amount of the new charge for pensions insurance—they would have been considered extravagant dreamers. While not recommending the abolition of Approved Societies, mainly because such an attempted step would give rise to insuperable political difficulties, the witnesses recommended that they should be confined to cash services only.

With regard to a whole-time salaried medical service the witnesses said that this was no essential part of their scheme, but they submitted that the history and traditions of the medical profession showed that it stands out as one in which devotion to duty, to science, and to public welfare takes first place, and they could not agree that medical men would change their characters "if they became public servants instead of the servants of the public."

All hospitals, it was contended, should be organised under one public authority with allied treatment centres. The Labour Party would give voluntary hospitals the option of being taken over by the health authorities entirely or of receiving grants from public funds conditional on efficiency. Pressure on hospital beds in the towns should be relieved by the transfer of convalescent cases to country homes.

### EVIDENCE OF APPROVED SOCIETIES.

*Grand United Order of Oddfellows* (App. XCV. and Q. 22405–22597).—This evidence, which was given by Mr. W. McLean, accountant to this Society, was mainly on questions of machinery as affecting Approved Societies, and included a recommendation that dental treatment should be provided as a general statutory benefit to be administered by the Approved Societies, and a suggestion that the Minister's Consultative Council should be reconstituted on a more representative basis.

*United Patriots' National Benefit Society and International Society of Medical Hydrology* (App. XCVI. and Q. 22598–22730).—The evidence given jointly by these bodies was confined to the question of spa treatment, and was submitted by Mr. J. M. Roberts, Dr. Fortescue Fox, and Mr. John Halton. The Approved Society has been impressed by the large proportion of its own sickness claims due to rheumatism and allied disorders. They also quoted the Ministry of Health's report, as follows:—

> Nearly one-sixth of the industrial invalidity of this country is due to diseases classified as "rheumatic." Each year these diseases are costing Approved Societies nearly £2,000,000 in sick benefit, and the nation over 3,000,000 weeks of work from the insured population alone.

The importance of spa treatment was urged upon the Commission, and it was stated that the spas forming the British Spa Federation were prepared to put into operation a scheme for the treatment of insured persons. It was suggested that while such a scheme at the outset would require financial assistance from the Treasury, its cost would be reflected in large economies in sickness benefit. The suggested scheme included the certification for spa treatment by the panel doctors, examination by a small medical board at each spa, and the extension of existing accommoda-

[4] Plummer, H. S., and Boothby, W. M.: Jour. Iowa State Med. Soc., 1924, xiv., 66.
[5] Mellanby, E., and Cowell, S. J.: Quart. Jour. Med., 1924, No. 69, p. 1.
[6] Fraser, Prof. F. R.: Brit. Med. Jour., 1925, i., 1.
* References to the paragraphs in the printed statements issued as appendices to the reports of the oral evidence are given thus: "App. X. 69," and references to the oral evidence thus—Q. 1369.

tion by the establishment of hostels or approved lodgings.

The witnesses appeared fairly confident as to the practicability of increasing the spa accommodation and the availability of the supply of waters, so as to afford adequate treatment to those of the insured population suffering from rheumatic diseases. It was thought that three-tenths of such cases were suitable for spa treatment.

*Scottish Coöperative Friendly Society* (App. LXXVIII. and Q. 20115–20341).—Mr. W. Thomson, secretary of this Society, gave evidence which included proposals that medical benefit should be extended to the dependants of the insured, and that sickness benefit should be raised at least to the level of unemployment benefit.

The advisability of increasing maternity benefit is doubtful unless steps were taken to limit the fee charged by doctors for attendance at confinements. In practice we understand this benefit is almost or wholly absorbed by the doctors.

Dental benefit, it was submitted, should be extended and made statutory; judging from inquiries received, optical benefit was thought to come next in popularity. It was suggested that where, on questions of medical certification, the State medical referee differed from the panel doctor, the difference, instead of being referred to arbitration, should be settled by the Board of Health bringing the parties concerned together, hearing the evidence, and deciding the matter as between the medical experts and the insured person.

(Q. 20269–70.) Would not that need a third medical man if you want an expert interpretation of the medical certificates?—I would have hopes that the two medical men, the State referee and the panel doctor, if brought together, would come to agreement.

One would have to admit he was wrong?—Yes, and one has to admit he is wrong under present circumstances.

*Edinburgh Friendly Societies' Council* (App. LXXXI. and Q. 20637–20759).—Mr. T. J. Addly gave evidence. This Council, representing 100,000 insured persons in Edinburgh and district, was opposed at present to the extension of the insured class, but thought that the benefits under the Act should be extended so as to include nursing, dental treatment, and the services of specialists and consultants. They were of opinion that the present method of administration by Approved Societies and Insurance Committees should be continued.

Nursing was regarded as the first essential extension, although the witness agreed that the services of specialists and consultants, as the natural complement of medical benefit, should logically come first. The Council, however, felt that these services could wait as part of an insurance scheme, because of the extent to which they were already available free to insured patients at hospitals.

*Sons of Temperance* (App. LXXXIX. and Q. 21395–21631).—The membership of this Society is 131,000. Evidence was given by Mr. T. W. Huntley. Recommendations with regard to specialist and consultant services included a suggestion that, in the first instance, there should be a freer and fuller use of the known abilities of those panel practitioners with exceptional qualifications. As the Regional Medical Staff of the Ministry were empowered to employ specialists in exceptional cases, it was thought that this provision might serve as the basis on which to build up such a service. Dental benefit, as a statutory benefit, was the subject of a somewhat qualified recommendation.

As regards the millions in the reserves of Approved Societies, it was stated that there was much misconception in many quarters.

As regards surpluses, similar misleading and exaggerated statements have been made. It seems to be overlooked that there are 14,000,000 or so of insured persons, and that even at the 1922 and 1923 valuations the average surplus declared as available for disposal is, roundly, £2 per insured person, and this sum is to be spread over five years.

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In previous articles the proceedings of the Commission were reported under the following headings: Introductory Note; The Scope of the Insurance Scheme (see THE LANCET, Jan. 31st, pp. 247–8); The Provision of Medical Benefit (Feb. 7th, pp. 301–3; Feb. 14th, pp. 355–6; Feb. 21st, pp. 403–5); Financial Provisions of the Act (Feb. 28th, pp. 454–7); Medical Certification and the Regional Medical Staff (March 7th, pp. 508–9); The Approved Societies and the Money Benefits (March 14th, pp. 564–5; March 21st, pp. 623–4); Evidence of the Hearts of Oak Society (March 28th, pp. 677–9); Evidence of the National Conference of Industrial Assurance Approved Societies and of the Manchester Unity Approved Society (April 4th, pp. 731–3); Evidence of Independent Order of Rechabites, of Rational Association Friendly Society, and of Miners' Societies (April 11th, pp. 784–6); April 18th, p. 839; Evidence of Mr. Alban Gordon (April 18th, pp. 839–40); Evidence of Joint Committee of Approved Societies, of Stock Exchange and Lloyds' Health Insurance Societies, and of Group of Catholic Approved Societies (April 25th, pp. 889–91); Evidence of the National Insurance Beneficent Society (May 2nd, pp. 943–4); Evidence of the British Medical Association (May 9th, pp. 993–5); Evidence of the British Dental Association and other Dental Organisations (May 16th, pp. 1044–6); Evidence of the Insurance Committees (May 23rd, pp. 1097–8); Evidence of Various Approved Societies (May 30th, pp. 1135–6); Evidence of the British Medical Association (June 6th, pp. 1184–6; June 13th, pp. 1248–50; June 20th, pp. 1315–6); Evidence of other Medical Bodies (June 20th, p. 1316; June 27th, p. 1348); Individual Evidence (June 27th, p. 1348); Medical Services in the Factory, Ministry of Health Inquiry Room, Evidence of National Sailors' and Firemen's Union and of Loyal Order of Ancient Shepherds (July 4th, p. 36); Evidence of Friendly Societies' Medical Alliance, South Wales and Monmouthshire Alliance of Medical Aid Societies, Friendly Societies' Medical Officers' Union, Association of Approved Societies, Standing Committee of Scottish Insured Women, and Society of Medical Officers of Health (July 11th, pp. 86–8); Evidence of the British Hospitals Association, the Sheffield Joint Hospitals Council, and the Middlesex Hospital (July 25th, pp. 181–2); Evidence of Opticians' Associations (August 1st, pp. 224–6); Evidence of Council of British Ophthalmologists, of Ophthalmic Benefit Committee, of Chemists, and of Drug Store Proprietors (August 15th, pp. 348–50); Evidence of Chartered Society of Massage and Medical Gymnastics, of the Ivory Cross, of Scottish Panel Chemists, Practice among Highland Crofters, and of National Farmers' Union of Scotland (August 22nd, pp. 402–3); Evidence of Nursing and other Women's Organisations (Sept. 5th, pp. 519–20).

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## WOMEN'S MEDICAL SERVICE FOR INDIA.

THIS service is open to fully qualified medical women of British or Indian nationality who desire to carry on work in India. With the present amount of Government subsidy the number of medical officers is limited to 44. Medical women proceeding to India to join the Women's Medical Service receive a sufficient sum for a first-class passage to India. On landing they are posted to one of the larger women's hospitals to gain Indian experience and to learn the language. During this period (from six months to two years) private practice is not allowed. For a further period they are appointed to act temporarily for medical women on furlough, during which time private practice is allowed. They are then definitely appointed to the charge of hospitals. Private practice is always allowed after the first two years, provided it does not interfere with official duties. The only exception is in administrative or educational posts, when an allowance in lieu of practice is given. The amount obtained from practice varies according to the station, but in most cases it forms a fair addition to the salary, varying from £150 to £1000 a year.

Excellent opportunities for surgery—especially gynæcological—are found in the Women's Medical Service. To those who are not keen surgeons opportunities are likely to open in the future in connexion with maternity and child welfare; medical women with administrative ability are also needed for the inspection of women's hospitals and other medical institutions.

Rates of pay are as follows:—

| Years of service. | Overseas allowance per mensem. | Salary per mensem. | English equivalent* per annum. |
|---|---|---|---|
| 1 to 3 .... | Rs.100 .... | Rs.450 .... | £440 |
| 4 to 6 .... | ,, .... | Rs.500 .... | £480 |
| 7 to 9 .... | ,, .... | Rs.550 .... | £520 |
| 10 to 12 .... | ,, .... | Rs.600 .... | £560 |
| 13 to 15 .... | Rs.150 .... | Rs.650 .... | £600 |
| 16 to 18 .... | ,, .... | Rs.700 .... | £640 |
| 19 to 21 .... | ,, .... | Rs.750 .... | £680 |
| 22 to 24 .... | ,, .... | Rs.800 .... | £720 |
| over 24 .... | ,, .... | Rs.850 .... | £760 |

* At rupee value 1*s.* 4*d.*

Furnished quarters are provided, representing an additional Rs.150 per mensem.

The cost of living in India is much higher than formerly, but it should be possible for a medical woman (with house provided) to meet actual household expenses for about Rs.200 per mensem, leaving the remainder of her salary for dress and personal expenses. To this must be added the necessary saving to meet additional expense for furlough and leave spent in the hills.

One month's privilege leave on full pay is granted each year. Furlough on half-pay at the rate of two months for every year of service is granted after every three years. Study-leave on two-thirds pay is granted to the extent of 12 months in the total service. There is a provident fund to which members of the service contribute 10 per cent. of their pay. The service contributes another 10 per cent. which accumulates at interest and is repaid on retirement.

Admission to the service is made by selection. Candidates in the United Kingdom should apply to the Hon. Secretary, United Kingdom Branch of the Countess of Dufferin's Fund, care of Major-General J. B. Smith, India Office, Whitehall, London.

## BERLIN.

(FROM OUR OWN CORRESPONDENT.)

### *Criminal Abortion in Germany.*

THE problem of the increasing number of cases of criminal abortion was discussed at the annual meeting of the Association of Bavarian Medical Men recently held in Augsburg, where Dr. Hoeber read a paper on the subject. He stated that the birth-rate had decreased from 27·6 per 1000 in 1903 to 20·4 per 1000 in 1924. In 1906 two million living children were born as compared with 1,300,000 in 1924. While the decline of the birth-rate might be partly due to venereal diseases and to contraceptive practices, he attributed a large proportion of it to abortion. Dr. Hirsch, of Berlin, stated that the relation between miscarriages and normal births in the capital was 93 to 100, and Dr. Hansberg, of Dortmund, found that in Germany about 1,000,000 abortions took place annually, with a mortality of 6000. In Bavaria alone, in 530 cases of puerperal fever occurring after a normal birth the mortality was 104, while in 113 cases of puerperal fever occurring after an abortion there were 54 deaths, being a mortality of nearly 50 per cent. This record shows how much more liable to puerperal fever women are after abortion than after normal childbirth. The number of convictions for criminal abortions in Bavaria was, in 1916, 72; in 1918, 138; in 1919, 119; in 1920, 293; in 1921, 538; in 1922, 660; in 1923, 586; in 1924, 690. It is notable that abortions are less frequent in unmarried than in married women, especially where there are already children in the family and the parents feel unable on economic grounds to cope with more. In Germany the excess of births over deaths was 12·1 per 1000 in 1913 against 7·1 per 1000 in 1924. It has been proposed not to punish artificial abortion when performed for economic reasons, so that it might be performed by respectable medical men instead of by unqualified and disreputable persons or midwives. In this way a good many women might be saved from puerperal fever. Dr. Hoeber rejected that proposal and the Association endorsed his view. According to him, it would be a mistake to abolish or to reduce the penalties for criminal abortion without a reduction of penalties in general. It should be the duty of the State, he said, to help poor parents in bringing up their children by providing dispensaries, creches, free meals, and such like. Foundling institutions after the pattern of those existing in some southern countries were not recommended. The children brought up in those institutions without a home and without maternal care, he held, did not prosper. Illegitimate children should, as far as possible, have the same rights as legitimate offspring.

### *Diseases in the Navy.*

Dr. Ruge, a naval surgeon, gave a historical survey in a recent issue of the *Marine-Rundschau* (Naval Review) of some morbid conditions which might be considered endemic in the navy. He first stated that drunkenness was gradually decreasing. Whilst in the "seventies" 0·28 per 1000 of the crew suffered from chronic alcoholism, that number had dropped to 0·08 per 1000 in the period of 1910–14 and had decreased still further during the war and after. Diseases due to acute drunkenness had decreased from 0·52 per 1000 in 1874 to 0·17 per 1000 in 1914. The diseases which he considers to be particularly prevalent in the navy are: colds, injuries, cellulitis, furuncles, and venereal diseases. Colds had been very frequent, the number being, in 1878, 940 per 1000, so that nearly every man had been infected during a year. The number had decreased to 490 in 1912, whilst after the war it had risen again to 570. Diseases connected with colds were tonsillitis, laryngitis, pharyngitis, pneumonia and pleurisy, rheumatism of muscles and joints. Engineers and stokers were especially liable to colds owing to the rapid change between hot and cold air to which they are exposed. In 1896, when wooden ships were still in commission, it was stated that the ratio of cases in such ships, as compared to iron ships, was as 3 is to 4. Among sailors the number of cases is lower than among stokers and engineers, while in the army the case-incidence is three times smaller than in the navy. An improvement had been obtained by compelling the men to change their wet clothes and to keep hardened by going bare foot and by providing cold baths and douches. According to statistical records, injuries are most frequent on Mondays and then decrease throughout the week, a fact in accordance with observations made by the Workmen's Insurance Offices, with regard to artisans being obviously in connexion with the relaxation occurring after the Sunday's pleasures. Formerly injuries were still more frequent and were particularly severe too in the heyday of sailing ships; one-third of the crews suffered from injuries, whilst now only 5 per cent. were affected. As to furunculi, the report states that those on the neck are very rare owing to the absence of collars in the navy, but it is striking that sailors suffer more than stokers, so that possibly the coal-dust may have a disinfectant action. Venereal diseases were a curse to the navy in foreign ports; in the former East Asia Squadron one-third of the men on an average suffered from venereal diseases. In the whole navy for the past year 17·4 per 1000 were syphilitic, as against 11·8 in 1913. After the war the number of syphilitic patients rose to 34·6 per 1000; this rate, however, was less than that of the merchant marine. Although no exact statistical records exist for the merchant marine, the officer of health of the port of Hamburg discovered 7000 cases of venereal diseases among the sailors within one year. Neurasthenia is not uncommon in the navy as a result of the severe duties, the influence of spirits, and of the climate of the tropics; it was almost unknown in 1877, where only 0·45 per 1000 were recorded, against 5·4 in 1923. Of tropical diseases, dysentery and yellow fever already before the war had nearly disappeared, while malaria had decreased from 78·1 per 1000 in 1877 to the insignificant incidence of 0·07 per 1000 in 1923.

### *Deaths from Electric Currents.*

According to a report made by Dr. Alwensleben to the Berlin Medical Society about 300 deaths annually occur in Germany from electric currents. In Berlin alone 600 injuries are recorded of which ten on an average are fatal. Death from electrical currents cannot be confirmed by post-mortem examination, as the danger of electricity is dependent on the intensity of the current and the duration of its action. Experiments on animals showed that a current of 20 volts did not produce any symptoms, but that 120 volts caused fibrillation of the heart, leading to death, although occasionally the cardiac action could be restored. 2100 volts produced an immediate

cessation of respiration, death occurring in one-fifth of a second. Currents of high tension produce severe burns. Two injured persons were shown to the society where currents of 15,000 volts had produced destruction by burning of an arm which was subsequently removed by operation. The direction of the current is, of course, essential for the prognosis. People with a so-called thymic constitution run greater dangers than others. Artificial respiration may sometimes save life, but the application of faradic currents to the vagus nerve is not advisable.

## IRELAND.

(FROM OUR OWN CORRESPONDENT.)

*The Irish Free State and the Medical Register.*

As anticipated last week the controversy regarding the Medical Register has entered on a new and more encouraging phase. The meeting of medical practitioners, summoned to protest against the proposed action of the Government, contented itself with a less intransigent attitude. The principal resolution was one welcoming President Cosgrave's invitation to a fresh conference, and expressing the hope that the conference might lead to a solution of the problem. On the following day the Consultative Subcommittee met Mr. Cosgrave, together with Mr. McGilligan, Minister of Commerce, in a long conference. In a carefully worded communiqué subsequently issued it is stated that:—

"At the conclusion of the proceedings it was understood that very considerable agreement on a line of policy had been arrived at consistent with the Government's decision to set up a separate Register and Council. It was generally felt that arrangements could be made to maintain existing rights and advantages of Irish practitioners qualifying in the Free State wishing to practise in England and elsewhere. It was also understood that the teaching schools would be in a position to assure their students that no hiatus would arise between the cessation of registration as at present and the adoption of a new scheme."

It is understood that the Free State Government is in hope of obtaining the consent of the British Government to a full measure of reciprocity between the Registers of the two countries. If they are successful in this then the main objections to the Government policy will fall to the ground. It is satisfactory at any rate that the Government and the representatives of the profession are now working in harmony.

Sept. 14th.

# The Services.

### ROYAL NAVAL MEDICAL SERVICE.

Surg. Comdrs.: A. R. Fisher to the *Columbine*, for R.N. Hospl., Queensferry; T. A. Smyth to the *Vivid*, for R.N. Barracks, Devonport; W. G. Edwards to the *Barham*, and as Squadron Medical Officer; and R. F. MacMahon to the *Malaya*.

Surg. Lt.-Comdrs.: F. E. Fitzmaurice to the *Vindictive*, and W. G. Thwaytes to the *Excellent*, both as specialists in Ophthalmology; F. G. Hunt to the *Champion*; and J. S. Elliot to the *Mackay*.

Surg. Lts.: W. G. F. Murray to the *Scarab*, and J. G. Maguire to the *Barham*.

ROYAL NAVAL VOLUNTEER RESERVE.

L. B. Hartley to be Surg.-Lt.

### ROYAL ARMY MEDICAL CORPS.

Lt.-Gen. Sir C. H. Burtchaell, ret. pay, late R.A.M.C., is appointed Col. Comdt., vice Maj.-Gen. Sir H. R. Whitehead, ret. pay, late R.A.M.C.

Maj.-Gen. Sir W. G. Macpherson, ret. pay, late R.A.M.C., is appointed Col. Comdt., vice Maj.-Gen. Sir D. Bruce, ret. pay, late R.A.M.C.

SUPPLEMENTARY RESERVE OF OFFICERS.

Capt. N. H. Smith, late Temp. Capt., R.A.M.C., to be Capt.

### ROYAL AIR FORCE.

Flying Officer T. V. O'Brien is granted a permanent commission in the rank stated.

The undermentioned are granted short service commissions as Flying Officers for three years on the Active List: J. McM. Wilder and H. G. Maguire.

Flying Officer H. W. D. Mackenzie is transferred to the Reserve, Class D. 1.

### INDIA AND THE INDIAN MEDICAL SERVICE.

The King has approved the retirement of Lt.-Col. F. O. N. Mell.

Temp. Lt. Shiva Shankar Gupta to be Temp. Capt.

Behari Lal Chopra to be Temp. Lt.

The following have been granted leave: Maj.-Gen. S. F. St. D. Green, Deputy-Director of Medical Services, Western Command. Lt.-Col. A. Leventon, Superintendent, Campbell Medical School, Calcutta. Lt.-Col. A. W. Overbeck-Wright.

The following officers have been posted to Burma: Lt.-Col. E. T. Harris and Majs. S. T. Crump and H. A. H. Robson.

Maj. (actg. Lt.-Col.) (now Lt.-Col.) H. M. H. Melhuish relinquishes the actg. rank of Lt.-Col. on ceasing to comd. a Field Ambulance.

Maj. (actg. Lt.-Col.) (now Lt.-Col.) R. B. B. Foster relinquishes the actg. rank of Lt.-Col.

HOMES AND EMPLOYMENT FOR CONSUMPTIVES.—On Sept. 9th Dr. F. G. Bushnell addressed the Plymouth and District Trade and Labour Council on the need for the proper care of the tuberculous in Plymouth. He asserted that the tuberculosis medical service as it now exists leaves the problems half solved, and is wasteful of both life and money. A system which allows the patient to return to almost certain relapse, and spread of infection to others, is inhuman and unsound. The care and after-care of consumptives should include settlement, housing, and employment, the maintenance of the families of patients who cannot support themselves under ordinary industrial conditions, and their medical supervision. Dr. Bushnell impressed upon his audience of trade-unionists that the principle of employment he advocated is totally opposed to that of exploiting a trade by untrained persons, and that it is quite different from patching up a man so that he can return to his original occupation and infect other men. What must be grasped was that many ex-sanatorium patients can even earn their own living at their own trade, provided that the hours are regulated to their strength, and provided that dividend earnings are reduced or foregone and the large overhead charges taken off their shoulders. But the surroundings must be adapted to their physical and mental condition. To return to the conditions of outside industry usually meant disaster, and after the sanatorium treatment and adaptation to work patients should remain as members of special colonies. Where it was impossible for a person to support himself by his own efforts in such a protected colony, he might still work a reasonable number of hours a day; the balance of loss must be overcome by a subsidy. The only successful tuberculosis settlement was that at Papworth, Cambridgeshire, and amongst the lessons of this great experiment were the following: Patients cannot be trained to a new occupation and left to battle alone with the industrial conditions of commercial life; the wages paid to skilled men must be at the trade-union rate for the number of hours for which they can work without injury; there must be a prospect of promotion in the mind of every settler—e.g., from sanatorium to hut or hostel or cottage, and, in the workshops, from part to full-time employment at union rates and advancement to being head of a department. The products of the settlers must be sold in the open market under the usual conditions, and the medical treatment and supervision must be as efficient as obtains in the best sanatoriums. In conclusion, Dr. Bushnell pleaded for support of a scheme for Plymouth along such lines. Twenty overcrowded badly-housed families, with the (so-called) breadwinner a consumptive, might go into decent healthy wholesome quarters, and at the same time Plymouth would benefit by the reduction of its consumptive population.

# THE MEDICAL REGISTER: UNTRACEABLE PRACTITIONERS IN 1925.

WE are requested by the Registrar of the General Medical Council to publish the following list of medical practitioners who have not replied to his inquiries as to the accuracy of their addresses. Anyone who finds his or her name included in this list should communicate immediately with the Registrar of the General Medical Council, 44, Hallam-street, Portland-place, London, W. 1, otherwise the name will be omitted from the next issue of the Medical Register.

Adams, Josiah Oake, 1866 (E).
Aitken, Charles, 1883 (S).
Alderdice, George Frederick, 1901 (I).
Alexander, William Nicholas, 1905 (S).
Arnold, Wilberforce John James, 1894 (I).
Arundel, Robert James, 1895 (I).
Attaoullah, Miss Hawa Khairul Nisa, 1922 (E).

Barry, John, 1867 (I).
Barton, Francis Alexander, 1887 (E).
Beaumont, Charles George, 1877 (S).
Bellot, Claude Herbert Lucien, 1910 (E).
Birch, Charles Ormond, 1886 (E).
Blair, Mrs. Nalini Heloise, 1899 (E).
Bloomenthal, Theodore, 1859 (E).
Boyd, John Alexander, 1907 (I).
Brennan, Charles Henry, *M.C.*, 1915 (I).
Briffaux, Philippe, 1915 (For.).
Browne, John Alexander, 1909 (S).
Brownlee, Arthur Oxland Innes, 1917 (S).
Butler, Charles, 1890 (E).

Cable, Walter George Hughes, 1906 (E).
Caley, Henry Albert, 1890 (E).
Campbell, Archibald Way, 1897 (Col.).
Campbell, Duncan, 1918 (E).
Campbell, Sir William, K.C.M.G., C.B., D.S.O., 1872 (S).
Cardozo, Elizabeth Mary, 1917 (E).
Carew, William King, 1914 (I).
Carter, Charles Noel, 1916 (E).
Cartwright, Robert Peploe, 1907 (S).
Castel, Adolphus Leo, 1887 (E).
Chapple, Aubrey Durant, 1885 (E)
Chittoory, Satyaraju, 1922 (Col.).
Cline, Eric Clarence, 1915 (E).
Coghlan, Harold Edward, 1899 (E).
Collyns, John Moore, 1900 (E).
Connolly, William James, 1907 (I).
Considine, Patrick Bernard, 1892 (I).
Cosgrave, Alexander Kirkpatrick, *M.C.*, 1909 (I).
Coutts, Duncan, 1905 (S).
Cowen, Alfred, 1893 (Col.).
Crowther, George Dobson, 1882 (E).
Crozier, George Rowland Henderson, 1903, (E).
Cullinan, Nicholas, 1897 (S).
Currie, George Burnett, 1884 (S).
Cuttle, Ronald, 1923 (Col.).

Dantes, Augustus Paul, 1912 (E).
Davidson, Herbert John, *M.C.*, 1916 (S).
Davidson, William Henry, 1901 (E).
Deamer, George Edwin, 1888 (E).
de Boer, Henry Speldewinde, *M.C.*, 1914 (E).
Denny, Charles John, 1865 (E).
de Saram, Herbert John, 1900 (E).
de Silva, Arthur Marcellus, 1905 (E).
De Watteville, Armand, 1876 (E).
Dickson, John Rhodes, 1890 (S).
Doolittle, Francis Xavier, 1916 (I).
Doudney, Edwin, 1870 (E).
Duke, Herbert Lyndhurst, O.B.E., 1910 (E).
Duke, Valentine de Saumarez, 1868 (E).

Eagleton, Arthur Joseph, 1913 (E).
Edey, Thomas Hugh, 1915 (E).
Ellacombe, Gilbert Henry Wemyss, 1896 (E).
Elrington, Nicolas, 1893 (E).
Etches, William Robert, 1883 (E).

FitzGerald, Gerald Hartas, 1918 (E).
Follit, Harold Harry Baily, 1908 (E).
Ford, Donald McNeill, 1901 (S).
Gaina, Nariman Jamshedji, 1915 (Col.).
Gardner, Robert, 1896 (S).
Garnett, Evelyn Alice, 1920 (E).
Ghaduri, Dwijendra Nath, 1921 (Col.).
Gilmour, Robert Thomas, 1892 (E).
Goode, George Ernest, 1900 (E).
Gordon, Henry Laing, 1889 (S).
Gracias, Cajetan Manuel, 1921 (Col.).
Grundy, Morris, 1905 (E).
Guinness, Ernest Whitmore Newton, 1892 (I).

Hamilton, Robert, 1901 (S).
Hanratty, Francis Vincent, 1911 (I).
Hardcastle, Alfred Herbert, 1893 (E).
Harcourt, Averyl, 1906 (S).
Hargrave, Herbert John, 1885 (E).
Harpur, James, 1900 (I).
Harris, Walter Terence Joseph, 1922 (Col.).
Harvie, James, 1904 (S).
Haynes, John Frederic, 1916 (E).
Hendricks, Hiram Porter, 1918 (Col.).
Hereford, Charles Francis Alexander, 1905 (E).
Hingston, Henry Sandiford, 1910 (E).
Hobson, Henry Overton, 1899 (E).
Hole, Richard Brassey, 1903 (S).
Huffton, Edith, 1915 (E).
Hunt, Edmund Langley, C.M.G., 1894 (I).

Ievers, Charles Langley, 1910 (S).
Infante, Ferdinando, 1923 (For.).
Ito, Koken, 1923 (For.).

Jackson, Oswald Egbert, 1900 (I).
Jamison, Robert, 1906 (I).
Jesudasan, Samuel, 1903 (Col.).
Johnston, James Alfred, 1880 (I).
Johnston, James Percy, 1910 (I).
Jones, Ralph, 1913 (E).
Joynt, Henry Noble Holton, 1888 (I).

Kaka, Dinshah Limji, 1924 (Col.).
Kelly, William Patrick, 1906 (I).
Keser, Jean Samuel, 1881 (E).
Kidd, Walter Aubrey, 1876 (E).
Kusumbeker, Gajanan Chintaman, 1915 (E).

Large, Stanley Dermott, D.S.O, *M.C.*, 1912 (S).
Leclezio, George Joseph Alexis, 1900 (E).
Lincoln, Joseph Maurice, 1894 (I).
Longhurst, Sidney Herbert, 1899 (E).
Lyon, George, 1891 (S).

McDonald, William Maclachlan, 1896 (E).
MacDonnell, Henry, C.B., 1861 (I).
Mack, Edmund Garvin, 1908 (E).
McKenny, Charles William, 1910 (I).
MacKenzie, Kenneth William, D.S.O., 1905 (E).
McQueen, Robert Martin, 1903 (E).
MacSwiney, Victor Howard Lucien, 1904 (I).
Maitland-Jones, Elizabeth, 1922 (E).
Mann, Alexander, 1909 (E).
Margenout, William Wendt, 1889 (S).
Marjoribanks, Eslyn Marcar, 1912 (S).
Martin, Louis Charles, 1900 (E).
Massey, Thomas Hunter, *M.C.*, 1906 (I).
Mathews, Charles, 1895 (E).
Mehta, Manecksji Sorabji, 1879 (E).
Mehta, Siavax Byramji, 1906 (Col.).
Meiring, Michael Ferreira, 1915 (S).
Michell, John Charles, 1885 (E).
Milne, William Stuart, 1902 (S).
Moody, Ludlow Murcott, 1918 (E).
Morgan, Edward Rice, 1871 (E).
Morrison, Michael Wellwood, 1911 (E).
Muir, David Clark, 1922 (E).
Mullen, Jarlath J., 1874 (I).
Mullick, Sarat Kumar, C.B.E., 1897 (E).
Neary, John Frederick, 1908 (I).
Newell-Roberts, Frederic Norman, 1923 (E).
Nicolas, John Daly, 1904 (S).
Norris, Samuel Knight, 1897 (S).

O'Brien, John Aloysius, 1876 (E).
O'Grady, Donald de Courcy, D.S.O., 1905 (E).
Ohlmus, Walter Theodore, 1916 (E).
Oluwole, Akidiya Ladapo, 1915 (E).
O'Neill, Sydney, 1922 (Col.).
O'Reilly, Bertram Charles Noble, 1909 (E).

Patrick, Joseph Henry, 1885 (E).
Pawan, Joseph Lennox Donation, 1912 (E)
Petrovitch, Milorad, 1924 (S).
Peverley, Walter Augustus, 1897 (E).
Pickthorn, Alfred John, 1886 (E).
Pope, George William, 1917 (I).
Powell, Arthur Worsley, 1895 (S).
Power, John Lawrence, 1905 (S).
Power, Maurice Aloysius, *M.C.*, 1907 (I).
Power, Michael, 1908 (I).
Pratt, William Sutton, 1884 (E).
Pritchard-Airey, William, 1901 (S).
Profeit, Alexander Charles, 1899 (S).

Ramsay, William Millar, 1905 (S).
Ramsey, George Arthur Stuart, 1921 (Col.).
Reid, Alfred, 1900 (E).
Reynolds, Benn Roland, 1919 (E).
Riches, Reginald George, 1909 (E).
Robertson, John Wight, 1915 (S).
Rostant, Pierre Ange, 1916 (S).
Runting, Ernest Arthur, 1912 (E).

Schofield, George Taylor, 1875 (E).
Seed, William Pope, 1893 (E).
Sells, Charles John, 1869 (E).
Shaw, Thomas Claye, 1868 (E).
Shaw, Townsend Wharton, 1889 (I).
Sheil, William Francis, 1918 (I).
Shepherd, Richard le Fleming, 1886 (S).
Shirgoaker, Jagannath Vishnu, 1910 (Col.).
Silvester, William George, 1897 (S).
Simpson, William Henry, 1918 (Col.).
Singh, Bawa Jiwan, C.I.E., 1889 (E).
Singh, Jung Bahadur, 1919 (S).
Sinha, Narendra Prasanna, 1884 (E).
Slack, William Augustus, 1919 (S).
Slaughter, Henry Lawrence, 1921 (E).
Smartt, Edward Nangle, 1886 (I).
Smith, Edward Arthur, 1906 (S).
Smith, Edward John, 1883 (E).
Smith, Ernest Sutton, 1879 (E).
Smith, Harry Emslie, 1900 (S).
Southwick, Michael Harold, 1922 (Col.).
Spence, John Buchan, 1882 (S).
Stevens, Mordaunt Augustus de Brouquens Capel, 1887 (E).
Stevenson, Walter, 1901 (I).
Stewart, John Symington, 1914 (S).
Stott, William Harle, O.B.E., 1897 (S).
Stuart, Forbes Jackson, O.B.E., 1906 (S).
Sully, Albert Max, 1887 (E).
Sutherland, Frederick Charles, 1894 (E).

Tatam, Edwin Charles, 1886 (E).
Taylor, Gerald Maberly, 1906 (E).
Tha, Richard Roland Htoon Oo, 1915 (E).
Thomson, Walter Proudfoot, 1920 (Col.).
Todd, Percy Everard, 1882 (E).
Tomkins, Arthur Wellesley, 1869 (I).
Totsuka, Bunkei, 1922 (For.).
Tucker, William Eldon, 1899 (E).
Twining, Edward Wing, 1913 (E).

Uniacke, John Joseph, 1904 (S).
Urquhart, George Theodore, 1921 (Col.).

Vernon, Robert Culbertson, 1901 (I).

Wallace, Gerald Douglas Hamilton, 1907 (E).
Ward, Francis, 1894 (E).
Waters, John Frank William, 1897 (E).
Waterston, George Fyfe, 1897 (S).
Watkins, Alan Percival, 1900 (E).
Webb, William Leslie, 1912 (E).
West, Percy Coulthurst, 1905 (E).
West, Stephen Harold, *M.C.*, 1904 (E).
Whichello, Harold, 1893 (E).
Williams, Cyril Mathias, 1915 (E).
Williams, Reginald, 1893 (S).
Williams, Ronald Edward, 1921 (E).
Wilson, Arthur William, 1901 (S).
Wilson, Mary Phœbe, 1920 (Col.).
Woodforde, George Arthur Herbert, 1884 (E).
Woollard, Herbert Henry, 1920 (Col.).
Wyndham, Thomas Lancelot, 1899 (E).

Young, John Franklin, 1908 (E).

# Public Health Services.

## SCHOOL MEDICAL SERVICE.

| Name of district. | No. on roll. | Av. elem. school attendance. | No. of routine children examined. | No. of special examinations and re-inspections. | Percentage of children found on routine examination requiring treatment.* |
|---|---|---|---|---|---|
| County areas— | | | | | |
| Cumberland . | —† | —† | 7,912 | 11,725 | 15·0 |
| Kent .. .. | 74,413 | —† | 22,829 | 15,748 | 14·6 |
| Notts .. .. | 49,453 | 44,020 | 12,746 | 10,070 | 10·7 |
| Urban areas— | | | | | |
| Bilston .. | —† | —† | 1,727 | 27 | 13·08 |
| Colchester .. | — | 5,733 | 1,014 | 3,019 | 29·5 |
| Coventry .. | 21,288 | 19,161 | 5,860 | 9,818 | 21·5 |

* Excluding dental defects and uncleanliness.
† Not given.

### *Three County Areas.*

*Cumberland.*—Dr. F. H. Morrison warmly praises the loyalty and support of his staff, medical as well as nursing, in carrying out their ever-increasing duties which have called for many hours of overtime. Depression of trade and unemployment, with their consequent lack of funds, produce more ailments among the children, coincident with lessened ability of the parents to obtain private medical treatment. Dr. A. H. Towers has drawn attention to the prevalent but unnecessary method of marching children into the class-rooms with much stamping of their feet—to keep time with the piano—and so raising clouds of dust which is highly injurious to the whole school population. He suggests that as little noise as possible should be the aim. Many methods for allaying dust are now in use in various places—e.g., the periodical spraying of floors with a dustless oil not only allays the dust, but decreases the cost of scrubbing, and prolongs the life of the treated floor. Dr. Morrison questions why there should be a bigger percentage of intermediates (17 per cent.) and of leavers (15 per cent.) requiring treatment than of entrants (14 per cent.). Is it not largely accounted for by the fact that the vision and hearing of entrants is very seldom tested at routine examination? The main causes of pathologically enlarged tonsils and adenoids are summarised as (1) bad teeth; (2) insanitary conditions of any kind; (3) impure water-supplies. All of these admittedly aggravate the condition, but the cause or causes lie deeper, as is evidenced by the many sufferers who have never been subjected to any such disadvantages. Since only one dentist is employed, none but the worst cases of dental caries can be referred to him.

*Kent.*—Among many interesting tables in Dr. A. Greenwood's report is one showing the percentages of dental caries in the various routine age-groups. The 8-year-old children, as is usually found, have the worst teeth. Mr. C. E. Thomas, one of the dentists, draws attention to the increase of dental caries at all ages. Much propaganda work is carried out by the dentists in lectures to mothers both at the schools and at the welfare centres. Dr. S. A. Tucker, in his inquiry on "the health of groups of school-children with special relation to breast-feeding," shows how, in almost every particular, the breast-fed child carries its early advantage well into school life. A smaller percentage of dental caries is present in breast-fed children than in hand-fed. Throat, nose, and ear trouble is less, and the percentage of breast-fed children having "no history of illness" is twice that of hand-fed children. Dr. F. Wolverson, in his investigation into malnutrition, finds that bread and margarine with tea is the common breakfast in Kent, and bedtime is "any old time." In a laudable endeavour to stimulate the interest of the parents he runs a voluntary "nutrition" clinic in his own time and without expense to the local authority. Dr. Greenwood remarks on the large amount of malnutrition recorded in secondary schools—373 cases among the girls and 126 among the boys. This is a disquieting feature and deserves the attention which Dr. Greenwood proposes to give to it. Dr. J. Selfe reports on the condition of tonsils and adenoids, for which he recommends treatment—only local conditions are mentioned, but the local sepsis may and often does have general ill-effects, and many anæmic and pretuberculous children have reacted extraordinarily well to the radical removal of septic tonsils and adenoids. Dr. W. Lessey finds there is a greater proportion of children showing marked anæmia in the country schools than in the town schools in his area. The macroscopic judging of anæmia is so dependent on the personal factor as to be misleading, and Dr. Lessey's percentages are very high—viz., 21 per cent. (slight and marked) in country schools and 19·7 per cent. in town schools. He associates the anæmia with four conditions: (1) Loss of blood from body parasites, mainly fleas, and from this cause he estimates that in the worst cases of flea bites some children were losing "pints of blood each year." (2) Diet—the iron-containing foodstuffs are largely omitted in the common dietary of these children. (3) Defective teeth. The proportion of dental caries is higher in country children than in town children, largely owing to lack of dental attention. (4) Ventilation and heating. The hygienic home conditions in the country are worse than in the towns.

*Nottingham County.*—Dr. T. E. Holmes, the school medical officer, contributes an introduction to a report by Dr. C. Tibbits, the senior assistant. The idea of furnishing the names of the 14 clean schools is an excellent one. Dental conditions and treatment are fully described—the quality of the work is evidently better than the quantity, but the reasons for the low percentage of defects treated (34 per cent.) are clearly stated. There is no special school of any kind in the area, except one which deals with mentally defective boys only, and the lack of a mentally defective girls' school is rather serious. For other types of exceptional children it may be said that a fair use appears to be made of special schools and institutions in other areas. There have been some excellent voluntary orthopædic clinics recently established by the Nottingham Cripples Guild, where all kinds of early treatment and after-care are carried on. A special investigation deals with goitre, as suggested by the Board of Education, but on more extended lines. The incidence is compared according to locality, environment, and geological formations, and it is shown that none of these have any marked influence in this county; in fact, limestone formations are actually associated with the lowest figures. The only definite difference is the higher figure for the western districts, and for this Dr. Tibbits discusses a possible explanation—namely, that the western side of the county is more shut off from the sea winds in which some at least of the iodine travels.

### *Three Urban Areas.*

*Bilston.*—In his short report Dr. T. Ridley Bailey draws attention to the poor hygienic condition of many of the schools in the area. Structural defects are admittedly difficult of remedy in these financially stringent days, but mere lack of attention on the part of school caretakers is reprehensible. Since the S.M.O. is also M.O.H., and carries out his duties unassisted except by one school nurse, the work must of necessity suffer—the small numbers of special cases (13) and of reinspections (14) seem ample evidence of this, and is reflected in the lack of interest of the parents, only 28·5 per cent. being present at routine examinations. No school dentist is employed, and as Dr. Bailey states: "With 43 per cent. of children showing four or more teeth decayed and 37 per cent. with conditions less severe, the committee have abundant evidence that the appointment of a dental surgeon is extremely urgent." No case of bronchitis and only one cardiac (functional)

defect is recorded in the return of defects found at medical inspection. Apparently no special provision is made for abnormal children in the area.

*Colchester.*—The comparative tables given by Dr. W. F. Corfield show at a glance the results of the work during the last few years. The progressive growth of cleanliness and the consequent decrease in "dirt" diseases is clearly shown. The percentage of clean heads has risen from 89·7 per cent. in 1922 to 94·7 per cent. in 1924, while scabies, impetigo, blepharitis, and conjunctivitis have all decreased in the same period. Appreciation of the benefits of the medical work is evidenced among the parents by the percentage who attend the inspections—viz., 77·8 per cent. It was thought advisable to close many of the schools during epidemics, but it is extremely doubtful if this measure is at all effective in urban districts. To provide for those children with very defective eyesight a new "sight-saving class" with up-to-date apparatus was established. In spite of further provision being made for dental treatment, 60 per cent. of the children requiring treatment failed to get it.

*Coventry.*—Dr. E. H. Snell remarks that the increase of verminous heads from 1400 last year to 2200 this is more apparent than real, and is accounted for by the fuller inspection consequent upon the increase of nursing staff. Tuberculosis is comparatively rare amongst the school population, the percentage of definite cases of all forms being only 0·15 per cent., and more than half of these are cases of glandular affection. Visual defects were found in 7·6 per cent. of the children examined, and comment is made on the not uncommon discovery of children of 11 years with very bad eyesight. It is in such cases that observant teachers could render much assistance by bringing them to the notice of the S.M.O. Only 54 cripples of school age are known to the school medical department, and amongst them no case of cardiac defect is mentioned. This is an incredibly small number, as Dr. Snell himself admits. No case of malnutrition was noted during routine medical inspections, and only three cases of anæmia were seen—either the standards adopted by the examining officers are very low or Coventry is an unusually healthy place. Comment is made on the percentage of poor nutrition being highest in the intermediate group, and it is tentatively suggested that this may be due to war conditions falling heaviest on this group. In part it may be so, but the 7 to 8 year old period is essentially the "stretching" period when the children of that age are relatively taller and thinner. Two excellent open-air schools are held, but the accommodation is much too limited for the number requiring such treatment.

## PORT SANITARY AUTHORITIES.

THE annual report of the medical officer of health to the port sanitary authority of *Liverpool* for the year 1924, signed by Dr. E. W. Hope, the former M.O.H., and by Dr. A. A. Mussen, his successor, gives a very full account of the discharge of great responsibilities of these officers in relation to the port. As regards infectious disease, only one case of small-pox (from Lisbon) was landed; from one ship eight cases of typhoid were recorded (from Bombay), one died on board, three were sent to Fazakerley Hospital, four were later reported from their homes; no cases of plague, cholera, or typhus occurred; 58 cases of phthisis came under notice, 29 in sailors and 29 in passengers. Several infectious cases were accommodated in the port sanitary hospital at New Ferry. Grain dermatitis caused by a mite (*Pediculus ventricosus*) in barley from Morocco occurred among dock labourers, and people living in adjacent houses into which the dust of this cargo was blown were also infected. Rats to the number of 62,953 were caught or destroyed; in the city, 1120 were black and 15,171 brown, but in the port the proportions were reversed, 14,809 being black and 326 brown—in all over 15,000 of each. Five ships were fumigated with hydrocyanic acid, averaging 21 rats killed in each, and in 106 ships sulphur dioxide was used, averaging 60 dead in each. The number killed by the Corporation staff is not a measure of the staff's activity, as its chief function is to keep moving on and taking samples for examination from all round the port in order to get early warning if the rats in any area are becoming plague-infected. Of 6506 rats inspected in 1924 all were free of plague. Rat-catching in ships is the duty of the owners. The number of rats ashore is diminishing by extended use of ratproof sheds. Rats find harbourage in temporary wooden offices, in accumulated sweepings, and in heaps of working gear. One inspector devotes most of his time to this problem; his standard is high, and he has secured the coöperation of the officials of the docks: "some even admit that it pays." An investigation on the destruction of vermin, particularly bedbugs, as carried out by Prof. R. Newstead and others, is reported in an appendix. As a result of the investigation, 3 per cent. hydrocyanic acid gas is recommended for the complete extermination in three hours of bedbugs and their eggs, but tongued and grooved wooden linings of the compartment must first be removed. Venereal diseases are being firmly tackled; there is a seamen's dispensary, with a staff consisting of a whole-time assistant medical officer and two orderlies, one of whom lives on the spot, and is on duty daily till 8.30 P.M. The average patient is very attentive to treatment, but many cease attendance prematurely. Printed cards of advice are issued to ships giving the address of the dispensary, and a small map showing its position. During its ten months of work 428 new cases have attended. The illustrations show the excellence of its equipment. 5194 ship inspections were made by inspectors, 732 by medical officers. Of the nuisances, 91 per cent. were due to lack of cleanliness, often because sailors when they leave ships leave them in a very dirty condition. It is becoming more usual now to take on an extra hand (called a "Peggy") to attend to the cleanliness of the crew spaces, so these dirty conditions may be less constant a feature in future. Many aliens (20,594) arrived in Liverpool during the year; four were rejected as weakminded or insane, two as suffering from communicable disease, one, a case of trachoma, deported from the United States, as "having a disease likely to cause him to become chargeable to the public." British emigrants numbered 86,693, more than half going to British North America; of the second and third-class passengers, who are all examined by Board of Trade inspectors, 18 were rejected as having infectious disease. Second and third-class passengers for the United States are inspected by a medical officer of the U.S. Public Health Service; if verminous they are disinfested, along with their baggage, at one of the city hospitals. There are seven trained food inspectors, so little delay is caused in the inspection of even the great quantity of food that passes through this port. During the year 89 tons of meat, 161 tons of canned goods, 1217 tons of fruit (partly due to a dock strike), and 3537 tons of cereals were found unfit for human consumption. As much as possible is released to be made up into poultry food, dog biscuit, and the like. In all, 5017 tons of food were condemned, but apparently all this material was utilised in one way or another, though not for food.

Dr. A. B. McMaster, medical officer of health for *Dover*, in his annual report for 1924, states that 3138 brown rats were caught in the town on bird-lime or in traps, 469 in the port, and 32 on board ships. During the year half a million passengers arrived from abroad, of whom 136,607 were aliens. Only two are mentioned as suffering from infectious diseases, one with measles and the other with enteric fever. The import trade of the port is chiefly concerned with fruit and yeast from France, and rabbits, yeast, and poultry from Belgium. Of 35,000 tons of foodstuffs landed 15 tons were condemned. With regard to the health of the town itself, Dr. McMaster reports that the number of families occupying only one or two rooms is increasing, owing to lack of housing. There was in his area in 1924 a milk-borne epidemic of enteric fever, due to the *Bacillus paratyphosus* B;

50 cases were notified, with one death. The source was with difficulty discovered, but the following story was finally elicited. Four retailers got milk from farm B; the report on this milk proved unsatisfactory. At this point Farmer B admitted that the milk came from his brother's farm, C. So now, late, the staff of farm C had to be examined. Farmer C and one of the milkers were found to be carriers, and would take no measure of security till forced, which meant further delay. The epidemic would have been much less extensive had there been water carriage of sewage at the farm, or if the milk had been properly cooled, or if there had been facilities for the washing of hands before milking—in other words, greater cleanliness. Dr. McMaster insists that clean milk can be produced on farms even if the buildings are old, provided that methods of thorough cleanliness are rigidly followed, and that if milk were sent clean from the farms pasteurisation would be unnecessary. The Necessitous Milk Scheme supplied 201 persons in 148 families, 15 taking dried milk.

Dr. A. N. Stevens, medical officer of health for *Great Yarmouth*, states the death-rate in 1924 as 10·8, infantile mortality-rate 63, birth-rate 18. Most deaths (48 per cent.) occurred after the age of 65. Malignant disease and heart disease each caused 77 deaths, and tuberculosis 62. Infectious disease did not call for any school closure in this year. The chief imports are timber and salt from abroad, stone and grain coastwise; the export is fish. Amongst other foodstuffs, 33 tons of fish were condemned and destroyed. 2463 rats were killed, apparently none in ships or in the port. A rat-catcher has been set to work under the rat officer. Sixty-two vessels were disinfected, and, apart from foul pickle, uncleanliness was the chief cause of complaint against ships inspected. The canal boats were all found clean and well kept.

## MENTAL HOSPITAL REPORTS.

THE eleventh annual report of the *General Board of Control for Scotland* includes notes of each of the Royal, district, and private institutions in that country, most of which have already been reviewed in these columns. The general survey remarks on the increase in the number of voluntary boarders, and the gratifying fact that parish councils are showing an increasing tendency to pay the cost of voluntary boarders in district asylums, believing that early treatment on this basis may prevent patients from becoming permanent burdens on the rates. Edinburgh Parish Council has arranged for the Royal Edinburgh Asylum to supply 20 beds for voluntary inmates. The undesirable custom of confining adult mental defectives in asylums still continues, but there is evidence of change. The care of the mentally defective is essentially an educational, rather than a clinical or curative, matter, and the two types of mental care do not conveniently go together. It is hoped that the contemplated scheme for the establishment of colonies for adult defective patients will reduce the practice to a minimum. The report suggests the addition of a children's ward attached to the observation wards of infirmaries, for the reception of cases such as encephalitis lethargica. The aim of the Board is to bring their institutions up to the level of general hospitals, and they are able to record that practically every institution in Scotland has a thoroughly equipped dental room and the services of a visiting dentist, while the appointment of specialists in varying branches of medicine is proceeding. Bangour Asylum, which had the advantage of inheriting the most modern treatment apparatus installed when the building was used as a war hospital, has submitted plans for a pavilion where all varieties of hydrotherapy and light treatment will be provided. The problem of typhoid fever in asylums[1] is referred to in the report. The number of carriers in Scottish asylums is now 16, and elaborate precautions have been taken in disinfection and distribution of underclothing and bed-linen. The institution where the majority of the carriers are resident is considering the erection of a separate villa for these cases. The statistical tables deal with 18,398 insane patients and 2452 mental defectives.

The *Down District Lunatic Asylum* at Downpatrick publishes an illustrated report. The average number resident during the year was 712; there was a slight decrease in the number of admissions on last year's figure. The majority admitted were melancholic, maniacal and delusional cases being next in number. The recovery-rate was 52·4 per cent. and the death-rate 5·9 per cent., a record figure for this institution. The dentist appointed last year has already treated 264 patients, including 1111 extractions. Two sets of wireless have been installed, and are much appreciated. Nine nurses obtained the M.P.A. certificate during the year, and the new regulations insist on attendants and nurses preparing for these examinations.

*Hereford County and City Hospital* at Burghill has 470 patients in residence, and, unlike most county hospitals, has a certain amount of vacant accommodation. The death-rate for the year has been 7·5 per cent. and the recovery-rate 29·6 per cent., with a further 10·9 per cent. discharged relieved. The arrears of dental work have been overtaken, and the dentist now finds one visit a month sufficient. A cinema apparatus is to be installed in the near future.

[1] THE LANCET, Sept. 12th, p. 560.

## INFECTIOUS DISEASE IN ENGLAND AND WALES DURING THE WEEK ENDED SEPT. 5TH, 1925.

*Notifications.*—The following cases of infectious disease were notified during the week: Small-pox, 32; scarlet fever, 1363; diphtheria, 738; enteric fever, 85; pneumonia, 416; puerperal fever, 44; cerebro-spinal fever, 8; acute poliomyelitis, 12; acute polio-encephalitis, 3; encephalitis lethargica, 43; continued fever, 14; dysentery, 6; ophthalmia neonatorum, 98. There were no cases of cholera, plague, or typhus notified during the week.

*Deaths.*—In the aggregate of great towns, including London, there were 5 deaths from enteric fever, 22 from measles, 5 from scarlet fever, 28 from whooping-cough, 11 from influenza, and 19 from diphtheria. There were 230 deaths of children under 2 years from diarrhœa and enteritis, as compared with 218, 177, 136, and 108 in the preceding weeks. In London itself the deaths from diarrhœa and enteritis in children under 2 years numbered 38, as compared with 40, 28, 20, and 19 in the preceding weeks; there were 10 deaths from diphtheria, 5 from whooping-cough, and 1 from influenza.

DONATIONS AND BEQUESTS.—Mrs. Mary Ogden, who left £12,430, besides other bequests, gave £100 each to the Cottage Hospital, Colwyn; the Manchester Institution for the Blind; Manchester Institution for the Deaf and Dumb; the Cancer Hospital, Manchester; Manchester Ear Hospital; and the Oldham Institution for the Blind. The residue of her property she left to Oldham Infirmary and the Manchester Royal Infirmary.—Mr. William Wright Warde-Adam, of Frickley Hall, Doncaster, left £2000 to the Royal Infirmary and Dispensary, Doncaster; £1000 to the General Infirmary, Leeds; £500 to the Yorkshire Institution for the Deaf and Dumb, Doncaster.—Mr. James Sutcliffe, of Rochdale, left £1000 to the endowment fund of the Rochdale Infirmary and Dispensary, to be known as the "James Sutcliffe Bequest," and £1000 to the endowment fund of the Manchester Royal Infirmary, to be known as the "James Sutcliffe Bequest."—Mr. Sydney Mason, of Anglesey and Ashton-under-Lyne, left as a contingent reversion £15,000 to St. Dunstan's Hostel for Blinded Sailors and Soldiers.—An anonymous gift of £1500 has been made to the Sheffield hospitals.—Alderman Walter Henry Barrett, of Pendleton, left £1500 to the Royal Hospital, Salford, for the endowment of a bed.—Mr. Frank Atkin, of Sheffield, left £500 to the Sheffield Royal Infirmary, and £250 each to the Sheffield Royal Hospital, the Jessop Hospital for Women, the Sheffield Institution for the Blind, the Sheffield University, and the Sheffield Society for the Prevention of Cruelty to Animals.—Miss Lilian Suzette Gibbs, F.L.S., of Santa Cruz, Teneriffe, has, among other bequests, left to the University of London a sum to produce a net annual income of £150 for a studentship in cancer research, either on the physiological or the chemical side, to be called "The Laura de Salicate Studentship" in memory of her mother.

# Correspondence.

"Audi alteram partem."

## RHEUMATIC INFECTION IN CHILDREN.

*To the Editor of* THE LANCET.

SIR,—As in part responsible for the emphasis which has been recently laid on the association between the rheumatic infection in children and poverty, may I say that I used the term "poverty" only as denoting the class of children from which hospital patients are drawn as opposed to that dealt with in private practice. That acute rheumatism in its major forms is overwhelmingly a disease of the former group no one could possibly deny. At the B.M.A. meeting at Bath some criticised the use of the word "poverty" on the grounds that the infection is not so particularly common in the children of destitute and out-of-work families as in those of the working artisan class. With the truth of this I altogether agree, though I do not yet understand the reason of it. But it seems a pity to me to obscure the main issue by quibbling over the term "poverty"; surely this is broad enough to carry the sense of the contrast we desire to stress.

For the point is a very important one. Of all the outstanding rheumatic problems there is none of greater importance than that of the environmental influences which predispose to the infection in children, and here we have one great fact to go on—namely, the predilection of the disease for the poorer classes. Let us, therefore, do nothing to obscure this fact. In opening the debate on rheumatism at the Medical Section of the Portsmouth B.M.A. meeting two years ago I particularly emphasised the significance of this association and appealed to workers in public health to find out and tell us the reason of it. At the Bath meeting this year the Public Health Section met the Children's Section in a discussion on the rheumatic problem, and told us of their investigations. It was their presence which made the meeting so different from any previous ones, so significant and encouraging.

I am, Sir, yours faithfully,

REGINALD MILLER.

Harley-street, W., Sept. 12th, 1925.

## QUININE IN PNEUMONIA.

*To the Editor of* THE LANCET.

SIR,—A record of over 200 cases of lobar pneumonia in the Wano Agency, North-West Frontier Province, India, treated with intravenous injections of quinine bihydrochloride, may be of more than local interest. In 1923–24 the death-rate of pneumonia in this agency was very high. It was noticed that there was a high incidence of malaria in the summer, followed by a high death-rate of pneumonia in the winter. As no other form of treatment seemed to lower the death-rate, I resolved to try intravenous injections of quinine. It was found that they had a very beneficial effect. The temperature came down, the restlessness subsided, and the pulse got better and stronger.

As soon as a case was diagnosed as pneumonia a blood film was taken (which by the way in every case was negative for malaria parasites) and intravenous quinine gr. 7 in 10 c.cm. distilled water given. Another injection was given on the third day, and another on the fifth day, after which no more were given. No injection was given during the crisis. Quinine did not shorten the course of the disease or expedite the crisis. In about 50 per cent. of cases the crisis did not take place till the seventh or eighth day. If the pulse was weak quinine was given with 5 minims of adrenalin.

The following points were noticed:—

(1) That patients with enlarged spleens, due to malaria, did not stand a good chance with the quinine treatment.

(2) That when too much quinine was given it had a tendency to make the sputum very viscid, and there was difficulty in expectoration. This was counteracted by tr. jaborand., ℥x, added to mist. stim. expect., ℥i.

(3) That quinine given when the crisis was expected had an unfavourable effect on the heart. The pulse was weak and thready, and the patient showed a tendency to collapse.

(4) That quinine injections given judiciously and in moderate doses definitely had a good pneumococcicidal effect on the disease even in very severe cases of double pneumonia.

(5) The mortality of chronic malaria cases was more than that of non-malarial cases, who had been free from fever during the summer.

The result of the injections was as follows: In Sarwakai, out of 40 cases of lobar pneumonia, there were three deaths only. In Sararogha (civil), out of 22 cases, there were three deaths. In Jandola there were no deaths amongst the first 30 cases treated, while the average of deaths amongst the remainder was 15 per cent. Those were very bad cases of pneumonia. On the other hand, in the brigade at Sararogha, where the cases of pneumonia were not treated by quinine, the case mortality averaged 25 per cent.

I am, Sir, yours faithfully,

R. KHAREGAB, M.B.,
Captain, I.M.S.; Agency Surgeon, Wano.

## THE "COMMON COLD."

*To the Editor of* THE LANCET.

SIR,—The season of "colds" is at hand; indeed, an epidemic has been already reported. It is a curious fact that the general public has not realised that the common application of the word "cold" is a complete misnomer and, moreover, actually misleading. There is a disarming simplicity about the word, and in the public mind it is associated with "draughts," "cold winds," and so forth, and the idea is inherent that prevention and even cure lie in the piling on of additional clothing.

No doubt there is some connexion with atmospheric conditions, but the public mind has entirely failed to grasp that the symptoms which are grouped together under the name of a "cold" are due to invasion of the system with micro-organisms of varying virulence, and that the results of such invasion are often disastrous. The lengths of the obituary columns in the daily papers during the winter are due mainly to deaths from respiratory complaints, many of which owe their origin to the common cold, and, in addition, it is well known to the medical profession that numerous chronic and disabling diseases can be traced to the same source.

In consequence of this want of knowledge among the community few or no precautions are taken against spreading infection. Sufferers from "only a cold" fulfil their social functions as usual, and attend places of worship and of entertainment, quite regardless of the dangers to which they are subjecting their neighbours. The circumstances of many people suffering from colds are such that it is quite possible for them to remain in bed for the first few days, and if only they would do so, not only would their own disability be shortened, but many susceptible persons would be spared a similar infection. Moreover, it is certain that if such a course could be *generally* followed, the *total* number of "lost working days" would be diminished very appreciably.

The time is ripe for a campaign by the health authorities against a complaint whose effects are so far reaching, but the first stage in such a campaign against the "common cold" and its unrealised dangers must be the discarding of its present name and the substitution of another more expressive of its actual nature.

I am, Sir, yours faithfully,

JOHN ALEXANDER DRAKE, M.D. Lond., D.P.H.

Harley-street, W., Sept. 12th, 1925.

# Obituary.

## WILLIAM ODELL, M.D. DURH., F.R.C.S. ENG.

BY the recent death of Dr. William Odell, of Torquay, in his seventy-fifth year, the medical profession has lost a fine example of all that was best in the "old school" of family practitioners. William Odell was educated at St. Paul's School, Stony Stratford, and at Hertford Grammar School. He received his medical education at St. Bartholomew's Hospital, qualifying as licentiate of the Society of Apothecaries in 1872. He gained the M.R.C.S. Eng. in the same year and the Fellowship four years later, when resident surgical officer at Hertford County Hospital. In 1901 he became M.D. Durh. After holding hospital appointments for five years, he took up private practice in Hertford in 1878 and later in Toronto, until in 1889 he settled in Torquay. Dr. Odell held the appointments of honorary consulting physician to the Western Hospital for Consumption, honorary consulting surgeon to the Erith House Institute, and honorary physician to the Temple Lodge Home. He was an honorary life member of the St. John Ambulance Association, and did much work in connexion with the Epsom College Foundation, of which he was local secretary. During the war he was physician to the Western Auxiliary Military Hospital in Torquay. Throughout his professional career he took an active interest in medical education and politics, and was at one time president of the Torquay Medical Society. Dr. Odell made several contributions to medical literature, particularly with regard to the treatment of tuberculosis.

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THE LATE DR. R. B. ESKRIGGE.—Richard Bertram Eskrigge, L.R.C.P. Edin., M.R.C.S. Eng., of Royston, Barnsley, Yorks, died on August 31st in his sixty-third year. He received his medical education at the Manchester School of Medicine, qualifying as L.R.C.P. Edin. in 1885, and obtaining the membership of the Royal College of Surgeons of England in the same year. For 37 years he practised in Royston, where he was held in the highest esteem.

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THE LATE DR. G. LOVE.—Gilbert Love, senior, M.D. Belf., of Great Budworth, Cheshire, died at the age of 60 on Sept. 6th, as the result of a distressing accident when on holiday at Downpatrick in the north of Ireland. While out shooting, he passed through a hedge and a twig released the trigger of his gun, with the result that the charge shattered his leg. He lay bleeding for some time before he was removed to the local infirmary, where the limb was amputated. Dr. Love, who was one of the best-known practitioners in Cheshire, studied at Queen's College, Belfast, where he gained the medal in midwifery and diseases of women. He graduated M.D., Ch.B., B.A.O. in the Royal University of Ireland in 1888, and after serving as medical and surgical assistant in the Royal Hospital, Belfast, settled in Northwich, where he had an extensive practice, and was honorary surgeon to the Victoria Infirmary of that town. Dr. Love was a prominent Freemason, being Provincial Officer and Past Master of the Sincerity Lodge, Northwich. He was chairman of the Conservative Association, the Budworth Fête Committee, and the Northwich Infirmary Medical Board.

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THE LATE DR. W. J. LEIGHTON.—William James Leighton, M.D. Belf., of Chorley, Lancs, was found dead beneath his two-seater car on the night of Sept. 8th in Lucas-lane, close to Chorley. The car was overturned broadside across the lane, with lights burning. How Dr. Leighton lost his life is entirely unexplained. Dr. Leighton was 42 years of age and had practised in Chorley for nearly 15 years. He had consulting-rooms in St. Ann-street, Manchester, where he was hon. assistant surgeon in the out-patient department of St. John's Hospital for the Ear and Nose. At Chorley he was hon. medical officer of the Rawcliffe Hospital and hon. secretary of the Chorley Medical Society. He received his medical education at Belfast and Dublin, and in 1906 graduated M.B., B.Ch., and in 1909 obtained the degree of M.D. at Belfast. Before going to Chorley he was house surgeon to Bedford County Hospital and resident medical officer of the Belfast Corporation Fever Hospital, and resident clinical assistant at the Richmond Hospital, Dublin.

# Medical News.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION.—A two weeks' intensive course in medicine, surgery, and the special departments begins on Monday, Sept. 21st, at the Westminster Hospital. On the same day the Brompton Hospital starts a special two weeks' course in diseases of the chest. Beginning in October the Fellowship of Medicine will hold a series of lectures on tuberculosis in the lecture room of the Medical Society, 11, Chandos-street. The first lecture will be given on Oct. 12th, at 5.30 P.M., by Dr. L. S. Burrell, on Tuberculosis from the Physician's Viewpoint. All members of the medical profession will be welcomed. Also during October will be held a special course in diseases of the throat, nose and ear at the Central London Throat, Nose and Ear Hospital (an operative surgery class will be held in addition); a course in tropical medicine consisting of eight clinical demonstrations on Tuesdays and Thursdays; a combined course in diseases of children; a course in urology at St. Peter's Hospital; and a course in dermatology at St. John's Hospital. Copies of any syllabus, together with the Fellowship programme, may be obtained from the Secretary, 1, Wimpole-street, London, W. 1.

OPENING OF THE MEDICAL SCHOOLS.—The following functions will be held in connexion with the opening of the undermentioned London medical schools:—

*St. Bartholomew's Hospital.*—Old students' annual dinner, Thursday, Oct. 1st, in the Great Hall of the hospital. Chairman: Mr. J. Adams.

*St. George's Hospital.*—The school dinner, Thursday, Oct. 1st, at 7.15 for 7.45 P.M. at the Hyde Park Hotel. Chairman: Dr. Ashton Warner. The Rt. Hon. W. H. Bridgeman will propose the toast of the Medical School.

*Guy's Hospital.*—Address to the students, Tuesday, Sept. 29th, by Major J. H. Beith ("Ian Hay").

*King's College Hospital.*—The introductory address, Thursday, Oct. 1st, at 2.30 P.M., by Sir Arthur Keith, at the Medical School, Denmark Hill, S.E. 5. The annual dinner of past and present students will be held at 7 for 7.30 P.M. on the same day at the Connaught Rooms, Great Queen-street, W.C. 2. Chairman: Sir Lenthal Cheatle.

*London Hospital Medical College.*—Annual old students' dinner, Thursday, Oct. 1st, at 7.30 for 8 P.M., at the Trocadero Restaurant, Piccadilly Circus.

*St. Mary's Hospital.*—Past and present students' annual dinner, Monday, Oct. 5th, at the Connaught Rooms, Great Queen-street. Chairman: Mr. Leslie Paton.

*Middlesex Hospital.*—In the Queen's Hall, Thursday, Oct. 1st, at 3 P.M., prize distribution by the Hon. Sir Arthur Lawley; inaugural address by Dr. C. E. Lakin on Tradition in Medicine. Annual dinner, Thursday, Oct. 1st, at the New Criterion Restaurant, Regent-street. Chairman: Sir Arnold Lawson.

*St. Thomas's Hospital.*—Annual old students' dinner, Friday, Oct. 30th, at the Hotel Victoria, Northumberland-avenue. Chairman: Mr. Samuel Osborn.

*University College Hospital.*—Annual dinner of past and present students, Oct. 16th, at Hotel Cecil, at 7.30 P.M. Chairman: Dr. Herbert Spencer.

*Westminster Hospital.*—Inaugural address by Prof. A. E. Gardner, Thursday, Oct. 1st, at 3 P.M., in the board room of the hospital.

CENTRAL LONDON THROAT, NOSE, AND EAR HOSPITAL.—The opening lecture of the winter session will be given at the hospital, Gray's Inn-road, W.C. 1, on Tuesday, Oct. 6th, at 4 P.M., by Dr. William Hill, who will take as his subject The Practice at "The Central" in the Late 'Eighties; a Period of Marked Advance and Foreshadowing Many Modern Improvements in Technique.

WEST LONDON MEDICO-CHIRURGICAL SOCIETY.—The opening meeting of the next session of this society will be held in the society's rooms at the West London Hospital, Hammersmith, on Friday, Oct. 2nd. The chair will be taken at 8.30 P.M., when Dr. H. W. Armstead will read his presidential address entitled Thirty Years of General Practice.

UNIVERSITY OF DURHAM.—In connexion with the opening of the winter session of the University of Durham College of Medicine, Newcastle-upon-Tyne, an introductory address will be given in the Examination Hall of the College on Tuesday, Oct. 6th, at 4.30 P.M., by Sir Humphry D. Rolleston on Physic and Poetry.

SOCIETY OF MEDICAL OFFICERS OF HEALTH.—The annual dinner of this society will be held at the Piccadilly Hotel on Friday, Oct. 16th, at 7 for 7.30 P.M. Dr. G. F. Buchan, the new President, will be in the chair, and the council hope that members will be present in large numbers. Ladies are invited, and members are asked to give early notice to the executive secretary, 1, Upper Montague-street, Russell-square, W.C. 1, of their intention to be present, with the names of their guests. A payment of 12*s.* 6*d.* for each ticket should be made with applications sent before Oct. 10th; after that date the cost of tickets will be 15*s.* each.

SOCIETY FOR THE STUDY OF INEBRIETY. — The eleventh Norman Kerr memorial lecture will be delivered by Dr. R. Hercod, director of the International Bureau against Alcoholism, Lausanne, Switzerland, on Tuesday, Oct. 13th, at 4 P.M., in the hall of the Medical Society of London, 11, Chandos-street, Cavendish-square, London, W. 1, when the subject will be Alcoholism as an International Problem. There will be a luncheon at 1.30 P.M. at the Welbeck Palace Hotel, Welbeck-street, Cavendish-square, W. 1, when Sir William Willcox, President of the Society, will preside, and Dr. Hercod will be present. Tickets 4*s.* each (exclusive of beverages). Members and associates desiring to be present are asked to send intimation to the hon. secretary, Dr. T. N. Kelynack, 19, Park-crescent, Portland-place, W. 1, with remittance before Oct. 7th.

PEOPLE'S LEAGUE OF HEALTH.—The League, by kind permission of the London County Council, will give the Sims Woodhead series of constructive educational health lectures at the Regent-street Polytechnic. The series will commence on Friday, Oct. 9th, at 6 P.M., and be continued on the following five Fridays at the same hour. Among those who have promised to lecture are: Sir Harry Baldwin, Prof. Leonard Hill, F.R.S., Prof. H. R. Kenwood, Mr. E. B. Turner, Prof. M. S. Pembrey, F.R.S., and Prof. B. J. Collingwood. At the conclusion of the series there will be an optional examination for those who have attended the lectures, and certificates will be issued by the Medical Council of the People's League of Health (with a travelling scholarship prize award, consisting of a week's visit to a foreign country, with facilities for visiting its health centres). Tickets and further information regarding the lectures held may be obtained from 12, Stratford-place, W. 1.

PUERPERAL FEVER AND THE M.A.B.—Arrangements have been made by the Metropolitan Asylums Board whereby in future the cases of puerperal fever referred to the Board will be concentrated as far as practicable in three of their institutions—namely, the Eastern Hospital, Homerton; the North-Western Hospital, Hampstead; and the South-Western Hospital, Stockwell—where special wards will be set aside for these cases and special medical and nursing staffs provided. The Board have also, with the approval of the Minister of Health, appointed an obstetric consultant at these three institutions. A circular (No. 622) has been issued by the Ministry to metropolitan borough councils in which it is recognised that suitable accommodation for cases of puerperal fever is available at other institutions, but expressing the hope that borough councils will take steps to secure, as far as practicable, that full use is made of the accommodation provided by the Metropolitan Asylums Board. The medical officer of health is requested to bring this point to the notice of general practitioners.

DEATH CERTIFICATION AND CORONERS' LAW.—In the course of his fourth presidential address to the Sanitary Inspectors Association, which recently held its thirty-eighth annual conference, Sir William Collins referred to the necessity of further reform in death certification and coroners' law. He recalled the disgraceful conditions which obtained during the last century, and speaking of untrustworthy verdicts, referred to the two classical examples: "Death from stone in the kidney which stone he swallowed when lying on a gravel path in a state of drunkenness," and "Child, three months old, found dead, but no evidence whether born alive." Though administration had effected much, legislation still lagged behind. "I remember," continued Sir William Collins, "in 1895, 1896, and again in 1907, voicing deputations to three successive Lord Chancellors, Lords Herschell, Halsbury, and Loreburn, urging reforms in death certification and coroners' law. From all we received promises of sympathetic and serious consideration, but practically nothing has been done. A Bill has, I understand, been introduced this session by a private medical Member dealing with certain reforms in the matter of death certification and disposal of the dead; but in view of a promise made by the Home Secretary of a Government Bill on the whole subject the prospects of the private Member's venture are not roseate. It is to be hoped," he added, "that the Home Secretary's assurances may prove more fruitful than those of the three Lord Chancellors."

VIENNA MEDICAL FACULTY.—A comprehensive series of post-graduate courses has been arranged by the Faculty for the academic year 1925–26. A full syllabus and information regarding lodging, &c., in Vienna may be obtained from the offices of the Vienna Medical Faculty, Schlösselgasse 22, Vienna VIII. It is requested that the cost of return postage be enclosed with inquiries.

PATIENTS' PAYMENTS TO HOSPITALS.—A return issued by the London Hospital Sunday Fund states that last year the payments made by patients amounted to £860,000—almost exactly one-third of the total income (£2,590,000) of the metropolitan hospitals. The expenditure was £2,887,000. Just under half a million was received in legacies, and of the total of 13,625 beds, 11,234 were constantly occupied.

CASUALTIES AT THE ROYAL FREE HOSPITAL.—Last year 1751 casualties were received, a number exceeded only by one other hospital. The completion of the first portion of the new home for nurses since the report was prepared will make it possible to open shortly single rooms for private patients of limited means.

LEICESTER PENSIONS HOSPITAL.—This hospital, which during the war served as the Fifth Northern General Hospital, is to be closed in November. There are rather more than 100 men still there, and it is expected that they will be removed to Birmingham.

COST OF TUBERCULOUS PATIENTS.—The annual report of the Hospital for Consumption at Brompton shows that the average stay of its 2389 in-patients was 49 days, and that the cost per head was £24 7*s.* 10*d.* The 459 in-patients of the sanatorium at Frimley cost £58 12*s.* 4*d.* each. Of the 326 beds at Brompton 280 were constantly occupied.

"A. J. S. RADIO" LUNCHEON.—The initials "A. J. S." are familiar to users of motor-bicycles, and it will not be long before they are equally familiar to users of wireless apparatus. On Sept. 10th "A. J. S. Radio (1914), Ltd." opened their London offices, showrooms, and demonstration rooms, and celebrated the occasion by a lunch. Mr. Edgar E. Lamb presided, and proposed the toast of "Our Guests," which was replied to by Mr. Otto Thomas and Prof. A. M. Low. Whilst manufacturing all sorts of wireless apparatus, including a fine-looking plant stand which is really a loud-speaker set, this company will specialise in compact sets for ordinary listeners-in.

MANCHESTER'S STREET ACCIDENTS: A POSTER CAMPAIGN.—Statistics for the year ending June 30th show that the number of persons killed in this period in Manchester was 59, 6 of these being at cross-roads, 11 at the approach to cross-roads, and 11 at the junction of side streets and main streets. The number of fatal accidents caused by stepping off the pavement in front of approaching vehicles was 24, involving 24 private motor-cars, 24 other mechanically-propelled vehicles, 7 tramcars, 4 taxi-cabs, and a number of other vehicles. In the non-fatal accidents 1855 persons were injured. Of these accidents 376 occurred at cross-roads, 493 at the junction of side streets and main roads, and 524 at other points. 427 of the accidents occurred through persons stepping off the footpath in front of approaching vehicles. In the non-fatal accidents were involved, among other vehicles, 588 private motor-cars, 389 other mechanically-propelled vehicles, 303 tramcars, and 79 taxi-cabs. Eighteen persons were hurt in pillion-riding accidents. On the suggestion of the chief constable it has been decided that the city shall be placarded with large posters warning against the dangers of street traffic, and also that posters warning children shall be placed on public buildings and on all schools in the city. Small forms containing warnings will be distributed to applicants for motor drivers' licences and to motorists' organisations. Similar forms will be supplied to the Director of Education for distribution to all the schools in the city, for the use of teachers so that they may consistently bring these safety rules to the notice of their scholars. There are injunctions to be observed by motorists—what they should do and not do, and a code for pedestrians. From the pedestrian's point of view perhaps the best thing in this poster is this: "Stand, look, and listen before crossing the road." The slogan "stand, look, and listen" ought to be memorised and practised by every pedestrian.

CONVALESCENT HOME FOR MERCHANT SEAMEN.—The Seamen's Hospital Society has for seven years maintained a convalescent establishment, the "Angas Home" at Cudham, near Orpington, Kent, for recovered patients discharged from the society's hospitals in London, but it has recently been found necessary to extend the accommodation. Such extension was made possible by the continued interest of Mrs. L. G. Angas, who gave the original house to the society in 1918, and on Sept. 11th a number of friends of the society gathered at Cudham, when Sir Arthur Clarke, chairman of the committee of management, asked Mrs. Angas to open the new buildings with a presentation gold key. In replying to a vote of thanks proposed by Admirals Sir Henry Jackson and G. R. Mansell, Mrs. Angas said she was glad to provide an extension to the buildings in memory of Captain the Rev. H. W. Angas, who devoted himself to relieving the hardships of seamen. Sir A. Clarke mentioned that, like the other establishments of the society, this building was now opened free of debt, but that £80,000 was wanted annually to keep the work going, and that subscriptions were welcomed. The home is a remodelled and extended country house, now able to take 40 patients, none of whom is chronic, in large grounds with lawns, trees, and gardens, 600 feet above the sea. Of the 40 beds, two, in separate rooms, are for officers; the others are in wards of various sizes. There are smoking rooms and a large billiard room with a piano and stage.

# Medical Diary.

*Information to be included in this column should reach us in proper form on Tuesday, and cannot appear if it reaches us later than the first post on Wednesday morning.*

### LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole-street, W.

MONDAY, Sept. 21st, to SATURDAY, Sept. 26th.—ROYAL WESTMINSTER OPHTHALMIC HOSPITAL, Charing Cross, W.C. Clinical demonstration every afternoon from 2 o'clock, with special demonstrations three times a week.—WESTMINSTER HOSPITAL, S.W. Special Post-graduate Course in General Medicine and Surgery, and the special departments. 10.30 A.M. to 5.30 P.M. daily. Demonstrations, lectures, &c. (first week).—HOSPITAL FOR CONSUMPTION AND DISEASES OF CHEST, Brompton, S.W. Post-graduate Course in Diseases of the Chest. Operations, lectures, lecture-demonstrations, demonstrations of surgical cases, of cases in wards, and in special departments (first week).—ROYAL FREE HOSPITAL, Gray's Inn-road, W.C. Lecture-demonstration on Treatment by Electrotherapy on Wednesday, Sept. 23rd, and the three succeeding Wednesdays, at 5.30 P.M., by Dr. C. B. Heald. The Direct Current especially in Relation to Fractures and Injuries.

# Appointments.

BINDLOSS, E. F., L.R.C.P. Lond., M.R.C.S., has been appointed Poor-law Medical Officer for Farnborough, Hants.

JONES, H., L.R.C.P. Lond., M.R.C.S., Certifying Surgeon under the Factory and Workshop Acts for the Maesteg District of the County of Glamorgan.

OGILVIE, W. H., M.D., M.Ch. Oxf., F.R.C.S. Eng., Assistant Surgeon to Guy's Hospital.

SAVORY, MARGARET B., M.B., B.S. Lond., House Surgeon to the New Sussex Hospital for Women and Children, Brighton.

Royal Northern Hospital: HUNTER, J. B., F.R.C.S. Eng., Surgeon, and BUTLER, H. O'NEIL, L.D.S. R.C.S., Assistant Dental Surgeon.

The Royal Alexandra Infirmary, Paisley: CALDWELL, J., M.B., Ch.B. Glasg., Senior Resident House Physician; POLLOCK, A. M., M.B., Ch.B. Glasg., Resident House Physician; MACARTHUR, J. C., M.B., Ch.B. Glasg., and GUNN, D., M.B., Ch.B. Edin., Resident House Surgeons.

# Vacancies.

*For further information refer to the advertisement columns.*

*Barnstaple, North Devon Infirmary.*—H.S. £150.
*Battersea General Hospital, S.W.*—Med. Supt. £300.
*Birmingham General Hospital.*—Asst. S. £50.
*Blackburn County Borough.*—Asst. M.O.H. £600.
*Buxton, Derbyshire, Devonshire Hospital.*—Asst. H.P. £150.
*Carmarthenshire Education Committee.*—Asst. Sch. M.O. £600.
*Chelsea Hospital for Women, Arthur-street, Chelsea, S.W.*—S.
*Colchester, Essex County Hospital.*—H.P. £200.
*Denbigh County Council.*—Asst. M.O. £600.
*Durham County Council.*—Asst. Sch. M.O. £600.
*East Ham County Borough Education Committee.*—Temp. Asst. Sch. M.O. At rate of £600.
*Edinburgh, Scottish Board of Health.*—Dist. M.O. £1000.
*Evelina Hospital for Children, Southwark, S.E.*—H.P. At rate of £120.
*Glasgow Royal Infirmary.*—Supt. £800.
*Hôpital Français, 172, Shaftesbury-avenue, W.C.*—Sen. and Jun. Res. M.O.'s. £120 and £100 respectively.
*Hospital for Epilepsy and Paralysis, Maida Vale, W.*—Res. M.O. and H.P. At rate of £150 and £100 respectively.
*Leeds Public Dispensary.*—Jun. Res. M.O. £150.
*Liverpool, David Lewis Northern Hospital.*—Med. and Surg. Tutors and Registrars.
*Macclesfield, Cheshire County Mental Hospital, Parkside.*—Asst. M.O. £350.
*Manchester, Ancoats Hospital.*—Asst. Surg. Reg. £40.
*Manchester and District Radium Institution.*—Asst. Radiologist. £500.
*Mental Hospitals Service under the L.C.C.*—Eighth Asst. M.O. £432.
*Miller General Hospital for South-East London, Greenwich, S.E.*—H.P. £125.
*Norfolk County Council.*—Asst. Tub. O. £600.
*Radium Institute, 16, Riding House-street.*—Cancer Research Worker. £500.
*Royal London Ophthalmic Hospital, City-road, E.C.*—Refraction Asst. £100.
*St. Bartholomew's Hospital and College.*—Res. Asst. Phys.-Accoucheur and Demonstrator of Pract. Midwifery.
*St. John's Hospital for Diseases of the Skin, Leicester-square, W.C.*—Clin. Assts.
*South London Hospital for Women, South Side, Clapham Common, S.W.*—H.P., three H.S.'s. Each at rate of £50. Clin. Asst. £1 1s. per attendance. S. to Ear, Nose, and Throat Department.
*South Shields County Borough.*—Ven. Diseases M.O. £750.
*South Shields, Ingham Infirmary.*—Jun. H.S. £150.
*Throat Hospital, Golden Square, W.*—Two H.S.'s at rate of £100. Also Hon. Surg. Reg.
*Weir Hospital, Grove-road, Balham, S.W.*—Jun. Res. M.O. £100.
*Whalley, near Blackburn, Calderstones Certified Institution for Mental Defectives.*—Asst. M.O. £300.
*Whipps Cross Hospital, Leytonstone.*—Specialist Consultant in Light Treatment. £300.
*Willesden General Hospital, N.W.*—H.S. At rate of £100.

The Chief Inspector of Factories, Home Office, London, S.W., announces vacant appointments for Certifying Factory Surgeons at Nairn, Nairnshire, and Guildford, Surrey.

# Births, Marriages, and Deaths.

## BIRTHS.

HALES.—On Sept. 12th, at Lees Lodge, Sheringham, Norfolk, the wife of Henry Ward Hales, M.D., of a daughter.

HART.—On Sept. 8th, at Platt's-lane, Hampstead, the wife of S. L. Hart, L.D.S., of a daughter.

HASLETT.—On Sept. 6th, at Holmbank, Upper Halliford, Shepperton, the wife of Dr. W. Handfield Haslett, of a son.

HAWLEY.—On Sept. 11th, at Hazelbeech, Coventry, the wife of Thomas Hawley, F.R.C.S., of a son.

MOLLISON.—On Sept. 12th, at Devonshire-place, London, the wife of W. M. Mollison, M.Ch., of a son.

## MARRIAGES.

ALLISON—STEEN.—On Sept. 9th, at Fitzroy-avenue Church, Belfast, Richard Sydney Allison, M.D., M.R.C.P., to Elizabeth Newett Barnett (Beth), younger daughter of Mr. and Mrs. J. Barnett Steen, Eglantine-avenue, Belfast.

HOSFORD—RANDALL.—On Sept. 8th, at All Saints Church, Ryde, Reginald Walter Patrick Hosford, M.B., F.R.C.S., to Nora Kathleen, daughter of Mr. and Mrs. F. W. Randall, of Mayfield, Ryde.

MICHELMORE—CHILTON.—On Sept. 7th, at Salcombe Regis, Ralph Godfrey Michelmore, M.B., B.S., of Sidmouth, to Charlotte Macintyre Chilton, youngest daughter of Mr. and Mrs. Charles Chilton.

MORGAN—MITCHELL.—On Sept. 11th, at University Chapel, King's College, Old Aberdeen, George Roderick Morgan, M.C., M.B., Ch.B., second son of George Blacker Morgan, M.D., Sunderland, to Betty Mitchell, M.B., Ch.B., youngest daughter of Peter Mitchell, M.D., Old Aberdeen.

SHORE—HOARE.—On Sept. 12th, at St. Bartholomew the Great, Smithfield, Thomas Henry Gostwyck Shore, M.D., M.R.C.P., to Viola Edith, second daughter of the late Mr. Frederick Hoare, of Craiglands, Crouch End Hill, and Mrs. Hoare, of Stanhope-gardens, Highgate, N.

THOMPSON—WILKIE.—On Sept. 8th, at the Parish Church, Falmouth, Brian G. Thompson, M.D., to Elsie Katharine, daughter of Colonel D. Wilkie, Indian Medical Service (retd.), and Mrs. Wilkie, of Coolmore, Falmouth.

YOUNIE—MITCHELL.—On Sept. 11th, at University Chapel, King's College, Old Aberdeen, John Younie, Indian Civil Service, son of Mr. George Younie, Rothes, to Dorothy Mitchell, M.B., Ch.B., D.T.M., eldest daughter of Peter Mitchell, M.D., Old Aberdeen.

*N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.*

# Notes, Comments, and Abstracts.

## SOME ACHIEVEMENTS OF INDUSTRIAL LEGISLATION AND HYGIENE.

*Being an Address delivered to the Congress of Industrial Hygiene, Amsterdam, Sept. 12th, 1925,*

BY SIR THOMAS OLIVER, M.D.GLASG.,
PRESIDENT OF THE BRITISH SECTION.

INDUSTRIAL hygiene is a comparatively recent branch of medicine. Although Ramazzini published his treatise on "Occupation Diseases" in 1700, it was the utilisation of steam as a motive power which stimulated the growth of modern industry. The manufacture of pottery, also of bricks for building purposes, is one of the oldest trades. Coal-mining, on the other hand, is one of the most important industries as it is one of the most dangerous. The Romans during their occupation of Great Britain made use of the coal obtained from "drifts" in the city and neighbourhood of Newcastle-upon-Tyne. There was no deep mining for coal in those days. It was in the early part of the thirteenth century that permission was granted by Henry II. to dig for coal in the North of England. During the early part of last century coal-mining in Great Britain was a procedure attended by great hardships, physical and social, upon those who followed the vocation. A hundred years ago the hours of work were long, 12 to 13 per day, boy labour was exploited, and female labour underground was utilised; there was only one shaft leading into the mine, which served both for men and material, and, as a consequence, not only was there no "through ventilation" of coal-mines, but in the event of the single shaft becoming blocked there were no means of escape for the men underground or their comrades above ground reaching them. It was the occurrence of such an accident at a pit a few miles from Newcastle, known as the Hartley Colliery Disaster, 60 years ago or thereabouts, which led to the compulsory provision of two shafts into a mine whereby there is the "through ventilation" which is in use to-day. The winning of coal has always been a hazardous occupation. It was therefore to be expected that the risks and dangers to life in coal-mining through accident and illness, also the long hours of work, would at the earliest opportunity engage the attention of the British Parliament.

Two months ago I was called professionally to see a retired coal-miner, aged 72, who told me that he began work in the mine at the age of 9; that he worked from 4 A.M. till 5 P.M., and for this 13 hours work per day he received 10*d*. He had to be wakened at 3 A.M., left the house at 3.30 A.M., and had to walk more than a mile to the mine where at the pithead he was obliged to be ready to descend at 4 o'clock in the morning. He often slept while he walked to and from his work, and like the boys younger than himself employed in the mine, he frequently fell asleep at his work, and for which he was ill-treated by the foreman. In the winter months collier boys never saw daylight except on Sunday. It is an interesting fact that as recently as the last decade of the eighteenth century, miners and salters—that is, men who obtained salt from sea-brine—were, practically speaking, serfs in Scotland. Those men could be bought and sold along with the purchase and sale of mines. It was not until 1799 that they received their freedom. The circumstance just mentioned may to some extent explain the deplorable conditions which prevailed in coal-mining in the early years of last century in Great Britain, also the unsatisfactory housing of coal-miners and their families.

### *Fatal Accidents.*

It is impossible to say what the number of fatal accidents was three-quarters of a century ago, for statistics at that period were not kept, but the death-roll was heavy. Before 1814 it was not the custom for inquests to be held on colliers who met their death by an accident in the mine. As showing the death-rate from mine accidents during the latter half of 1800, the following data supplied to me by Prof. H. Louis, of the Mining Department, Armstrong College, are of interest. Taking quinquennial periods, the death-rates from mining accidents per 1000 men employed underground in Great Britain were:—

| Year. | | Year. | |
|---|---|---|---|
| 1851–55 .. .. | 5·149 | 1876–80 .. .. | 2·709 |
| 1856–60 .. .. | 4·628 | 1881–85 .. .. | 2·312 |
| 1861–65 .. .. | 3·791 | 1886–90 .. .. | 2·042 |
| 1866–70 .. .. | 3·995 | 1891–95 .. .. | 1·704 |
| 1871–75 .. .. | 2·736 | 1896–99 .. .. | 1·479 |

If we take two later decennial periods for comparison, we find that the average annual deaths from accidents in British mines due to all causes were: 1873–82, per 1000 men employed 2·5, and from 1911–20 1·3.

With the exception of the United States of America the statistics of other countries also show a decline in the accident fatality-rates.[1] In Germany the rate, which was 3·18 per 1000 men employed in 1879, had fallen to 2·40 in 1914; in the United States the fatal accident-rate had risen from 3·5 per 1000 in 1890 to 3·62 in 1920, while during 1920 the rate for Belgium was 1·13, France 0·77, Great Britain 0·88, and 2·40 for Germany. Coal-mining in the United States is a comparatively modern industry; the men have not been so long trained as those in the older countries. In addition, many foreigners are employed and, as a consequence of difficulties incidental to language, orders given by officials may not be readily understood. The men, too, in order to make high wages work harder than in most countries. If the accident-rate is measured by the number of men killed for every million tons of coal raised, the figures for the United States compare most favourably with those of other countries.

### *Coal Mining.*

Speaking generally for all countries, but especially for my own, the figures show that improvement has taken place in the reduction of fatal accidents in coal-mining, largely consequent upon freer ventilation, daily inspection of the mine for gas before the men descend, greater use of safety-lamps, substitution of the higher explosives for ordinary black gunpowder, also the employment of skilled men to place in situ the cartridges and fire them.

Although one of the most dangerous of occupations, coal-mining in Great Britain remained free from protective legislation until 1842, when owing to the serious condition of affairs revealed by a Royal Commission, women and girls were excluded from working underground. It was not, however, until 13 years afterwards that measures were introduced to protect the health, life, and limbs of the workers. For the saving of life in coal-mines we are indebted to the attention given to the subject by men engaged in chemical and physical research. The employment of the "safety-lamp" recommended by Sir Humphry Davy has prevented many explosions, just as the daily inspection by trained men of the areas at the working face of the mine before commencing to hew coal has been the means of saving many a miner from getting "gassed." One other important circumstance has added considerably to the safety of the miner's vocation. Three-quarters of a century ago the dangers of explosive gases in coal-mines had been recognised, but it was not until a few more decades had passed that Prof. Galloway and Mr. H. Hall showed that as widespread explosions frequently followed the firing of cartridges in mines, some of these explosions were due to the dry coal-dust which was raised into the atmosphere catching fire and travelling with explosive rapidity through the underground passages. Men were thus killed partly by gas, partly by burns, and in other instances, where death was not immediate, by pneumonia. Coal-mining on a large scale in France, Belgium, and Germany is of recent date compared with that of Great Britain. It was not, for example, until 1766 that coal-mining in Westphalia became a prominent industry. Other coal-producing countries have profited by the experience, the mistakes, and failures of British mining methods. As an illustration of how hygienic measures introduced to protect the workers in one direction may inadvertently lead to disaster in another, I cannot do better than reproduce the experience of the German mining authorities in the Ruhr a few years ago. Before the war several of the coal-mines in Central and Western Europe had become infected by ankylostomiasis. I visited the Belgian, German, and Hungarian coal-fields, and I descended into the Lothringen Mine near Bochum. I was much impressed by the excellent organisation, the sanitary measures which had been carefully prepared by Dr. Tenholt, and the adequate hospital provision made by the mine authorities for combating the disease in Westphalia. Although the parasite had gained entrance into the tin-mines of Cornwall, British coal-mines, fortunately, remained free. Ankylostoma ova and larvæ require heat and a considerable amount of moisture for their development. A few years previously to my visit to Westphalia there had occurred explosions in the German coal-mines for which high temperatures and the dry coal-dust were partly believed to be responsible. With the view of reducing such risks it was decided to introduce water-spraying into the mines. This, however, only caused fresh trouble, for the mines became infected by the ankylostoma parasite, which it was believed had been brought thither by Polish and Italian workmen, also probably by some of their own miners who during the summer months had worked in the brickfields

[1] Kober: Industrial Hygiene, p. 145.

around Cologne and elsewhere. At any rate, in 1900 water-spraying of mines became general and the result was as follows :—

| Year. | Cases of ankylostomiasis. | Year. | Cases of ankylostomiasis. |
|---|---|---|---|
| 1896 .. .. | 107 | 1899 .. .. | 275 |
| 1897 .. .. | 113 | 1901 .. .. | 1030 |
| 1898 .. .. | 99 | 1902 .. .. | 1355 |

The rapid and great increase in the number of cases of ankylostomiasis after water-spraying can hardly be regarded as a coincidence.

As a class, coal-miners suffer less from pulmonary tuberculosis than most men employed in dusty occupations, but as Prof. E. L. Collis [1] remarks, "low as their phthisis mortality is, the experience for coal-miners displays certain statistical characteristics which are distinctive of dust phthisis," and these are "(1) an unusually late age of maximum incidence, and (2) an association with high mortalities from other respiratory diseases." Miners who are working at the coal face suffer from phthisis rather more than other miners below ground and workers above ground. Phthisis in coal-miners commences to express itself at and after 35 years of age, as the following figures show :—

| Periods. | Age periods— 35 | 45 | 55 | 65 and over. |
|---|---|---|---|---|
| 1890–92 .. .. | 1·45 | 2·07 | 2·23 | 2·03 |
| 1900–02 .. .. | 1·09 | 1·52 | 2·04 | 1·47 |
| 1910–12 .. .. | 1·02 | 1·31 | 1·43 | 1·02 |

The above data show the improvement which has taken place in the mortality-rate of coal-miners from phthisis.

*Manufacture of Lucifer Matches.*

There must be many in this audience who like myself, 20 to 30 years ago, were witnesses of the ill-health experienced by men and women who worked in match factories wherein white phosphorus was used. The men who dipped the matches in the phosphorus paste and the women who filled the boxes frequently suffered from necrosis of the jaw-bones or died from septic meningitis or broncho-pneumonia. In other instances where the poisoning was less severe the workers suffered from gastric trouble, anæmia, and albuminuria, or from a tendency of the long bones to become fractured owing to peculiar fragility. So great was the suffering of the persons who became affected that it became imperative that some united action should be taken by various Governments to produce matches which would strike anywhere without the workers incurring risk to their health. As far back as 1879 Switzerland introduced a Bill to prohibit the use of white phosphorus. In 1899 the British Government invited Sir Edward Thorpe, Dr. Cunningham, and myself to visit match works at home and abroad with the view of ascertaining how the workers might be protected against the risks they were exposed to. Like many of our Continental confrères, we were of the opinion that the time had come when a harmless substitute should be found for the dangerous white phosphorus. It was Lorinzer, of Vienna, who in 1845 first drew attention to necrosis of the jaw-bones as an occupational disease, but in every country in which lucifer matches had been made from white phosphorus there had occurred cases of "phossy jaw." Chemists vied with each other to find a safe substitute for the dangerous metalloid. To French scientists fell the honour of showing how by employing sesquisulphide of phosphorus lucifer matches could be made without risk to the health of the workers. After a congress of the various Governments held in Berne in 1906, the match-producing countries of Western Europe decided to manufacture lucifers by the safe method, and so successful has been the result that the occupation is now free from the risks of three decades ago. Phosphorus necrosis has disappeared. This is one of the triumphs of industrial hygiene of which chemistry and medicine may well be proud and for which we are indebted to France.

*Manufacture of Mirrors.*

Chemical research has also proved helpful in other trades. It is not so long ago since quicksilver was used in the manufacture of mirrors. Many of the men then employed suffered from mercurial poisoning. Apart from the unhealthy conditions set up in the mouth through vaporisation of quicksilver, the workers became the victims of muscular tremor and occasionally of paralysis. Since making use of nitrate of silver preparations the men have had good health and the industry is now regarded as a healthy one.

*Arsenical Pigments.*

Just over 20 years ago I was a member of the Dangerous Trades' Committee of the Home Office to whom was given the task of investigating several trades which were regarded as inimical to health. One of these was the manufacture and use of wall-papers which contained arsenic, also the manufacture, mixing, and use of "emerald green." It had been found that much illness hitherto unrecognised was the result of sleeping in bedrooms with walls covered by paper containing arsenical pigment. Men employed in the grinding and mixing of such colours suffered from ulcers on their hands and fingers and upon the genitalia. In other instances a painful neuritis was established which occasionally ended in paralysis. In the United States, in Holland, and other countries the subject had also received attention. In Massachusetts, for example, a law had been passed in 1900 limiting the amount of arsenic in wall-paper to the extent of 0·1 gr. per square yard, but at the time of the British inquiry alluded to, we found manufacturers had been placing several grains in a square foot of wall-paper. The use of arsenical pigments in wall-paper in Great Britain was subsequently prohibited, their place being taken by aniline and other safe colours. To the fortunate results which have followed in all the trades wherein arsenical compounds are used, stringent regulations, improved ventilation, and the employment of means for the removal of dust have contributed.

As an illustration of the good effected I need only allude to the experience of Sir Thomas Legge who, in 1900, found in one of the London factories wherein "Paris green" was made, that 20 out of the 33 male workers employed therein had to be suspended—that is, 60 per cent.; but as a consequence of more stringent regulations, cleanliness, baths, &c., he found, 13 years afterwards, that the suspension from work were only 0·6 per cent.

*Carbon Bisulphide.*

Thirty years ago in the manufacture of india-rubber goods in Great Britain there was much serious illness among the men and women employed in the factories. The illness was traced to the use of carbon bisulphide as a solvent for sulphur monochloride in the vulcanisation of rubber. The vapour of bisulphide when inhaled causes intoxication not unlike that which follows the drinking to excess of alcoholic liquors. In the milder forms there are headache, vomiting, and a staggering gait; in the more pronounced form the symptoms, while primarily of the nature of aggravated hysteria, occasionally become those met with in acute mania; in other instances again there are indications of peripheral neuritis followed by paralysis of the limbs. Since new methods of vulcanising rubber by means of the incorporation of flowers of sulphur in a closed chamber under the influence of heat have been introduced, the trade has become healthier and there are no longer the distressing and crippling forms of illness which attacked the workers less than half a century ago.

*Lead and Its Compounds.*

If there is one metal more than others which since the rise of the modern industries has exacted in all manufacturing countries a high toll of human life it is lead and its compounds. One thing characteristic of industrial lead poisoning is the insidious manner in which it may develop; ill-health may gradually steal over the workers, or on the other hand, symptoms may rapidly show themselves, as, for example, by the sudden onset of acute abdominal pain, or loss of power in one or both hands, between night and morning. As lead and its compounds are used in over 130 industries, this circumstance renders lead one of the most important metals from an industrial point of view, just as, regarded medically, it is one of the most interesting. In Great Britain and in Western Europe lead is present in ore as galena or sulphide, and as this is rather insoluble in weak acid solutions, miners who blast the ore and are exposed to dust do not suffer from plumbism but from a dust disease of the lung called *silicosis*. In the Broken Hill Mines of Australia lead was present a generation ago in the form of *cerussite* or carbonate; this, when inhaled as fine dust, is readily soluble and becomes not only a source of plumbism but of the severer type of the malady known as saturnine encephalopathy. It was a fortunate circumstance for the owners of the Broken Hill Mines that after the cerussite layer had been worked out the subjacent ore was found to be galena, for the mining of this was followed by a marked declension in the number of cases of lead poisoning. A strange circumstance, however, has arisen at Broken Hill. Recently there has been a recrudescence of lead poisoning; this was found to be due to the lead ore in places having become changed into cerussite.

As regards lead, the dangers of industrial poisoning occurs during the smelting of the ore, the extraction of silver from the pig lead, plumbing and soldering, the manufacture of white and red lead, the mixing and use of paints, the use of lead compounds in the manufacture of pottery and of accumulators for electrical purposes, also in the dyeing of textile fabrics, &c. It is hardly likely, owing to fuller knowledge among the workers of the value of personal

[1] Journal of Industrial Hygiene, May, 1925, p. 228.

hygiene and cleanliness, improved ventilation wherever dusty processes are carried on, periodical medical examination of the workers and enforced compliance with regulations, that the extremely serious and fatal types of lead poisoning with which some of us were familiar 30 to 40 years ago will ever again be met with to the same extent as formerly. In Newcastle-upon-Tyne, my own district, where it was once so frequent, lead poisoning has ceased to be the menace to the health of the workers it was a few years ago, and what is true of Newcastle is equally true of the country generally. In 1900 the number of cases of industrial plumbism in Great Britain reported to the Home Office was 1058, in 1923 the numbers were 337. The records for 1924 show a slight increase, and particularly is this the case for the manufacture of pottery, but as many of the men and women who have recently died had worked in the pottery trade for from 30 to 47 years it is more than probable that the seeds of their illness were sown before the introduction of the new methods in vogue. The fact remains that there is no comparison, so far as number of cases and severity of the illness are concerned, between industrial lead poisoning to-day and half a century ago.

*Conclusion.*

Industries rise and wane; methods of manufacture keep supplanting the older, and until new methods have had a trial we cannot always anticipate what the effects upon the health of the workers will be. The results already achieved mark an important epoch in the history of medicine. They are seen in the improved health and social betterment of the working classes. Chemical research has lent its helping hand. Nothing has done more than medicine to foster the spirit of "international brotherhood," especially that branch of it in which we are all interested and which has for its object the utilisation of means for the prevention of accidents in mine and factory, also for making occupation healthy, and a source of adequate income and contentment to those who follow it.

## ROYAL PHOTOGRAPHIC SOCIETY'S EXHIBITION.

THE advance which has been made in the scientific application of photography is strikingly shown at the Exhibition of the Royal Photographic Society which opened its doors on Sept. 14th at 35, Russell-square, London. Though pictorial prints never fail to interest the artistic sense, it is in scientific work that photography finds its real usefulness, and in the camera research has found a most powerful ally. The scientific section of this exhibition, which is the seventieth held by the Society, is extremely well patronised; the entries include Radiographic Transparencies, Microradiographs, Telephotographs, as well as examples of Astronomical, Meteorological, Aerial, Spectrum, and Stereoscopic Photography.

The Radiographs of Captain T. W. Barnard, F.R.P.S., of Madras, are well worth study. This well-known worker has subjects ranging from "Exostosis of Scapula, Lateral Aspect" (No. 824) to "Finger Print" (No. 832). Captain Barnard has made an extensive study of this application of photography, and the extent to which he has perfected the process is shown in No. 829, which is an excellent piece of work and shows much technical skill. Two transparencies (Nos. 839 and 840) represent an "Artificial Pneumothorax for Tuberculosis," and are very well done. No. 826, "Stones in the Kidney," and No. 841, "Stone in the Bladder," are good renderings, especially the latter, in which the various densities are beautifully shown. The Radiograph prints by Mr. Henry T. Ferrier are excellent examples; his (No. 629) "Pelvis, Extensive Injuries" being particularly noticeable, as also is (No. 640) "Frontal View of Sinuses of Head," by Mr. A. O. Forder. Messrs. Kodak, Ltd., show eight prints in this section, all typical of the excellent work produced by their Radiographic section. Miss Honor M. Bright is to be congratulated on her (No. 643) "Pseudo Coxalgia at 13." The Microradiographs are by Mr. Pierre Goby, and include stereoscopic prints in relief and pseudo-relief and high magnification. Of these, Nos. 32 (under catalogue No. 800) and 17 (catalogue No. 801) are worthy of notice. The section for Photomicrographs is well supported as is usual at this exhibition, and we notice that Dr. G. H. Rodman is still as busy as when he was president. His work this year deals with the structure of the petiole of the Water Hyacinth, and a series of Idioblasts in various Water Lilies. The former, which includes eight examples from sections stained by hæmatoxylin and anilin acid green, are by transmitted light. No. 8 of this collection, which is numbered 644 to 647 in the catalogue, represents "Petiole expansion showing detail of the membranous wall of air spaces," and is a transverse section ×220. This is done in Dr. Rodman's usual meticulous style, and is an excellent example of high-power photomicrography.

The section which promises, perhaps, to be of the greatest use to medicine is that showing specimens of photographs transmitted over long distances in America by ordinary telegraph lines. A comparison of the original and the print made from the telegraphed message shows no apparent loss in detail, the only difference being that the reproduced picture is not quite so brilliant as the original. The process, apart from this defect, which would seem only to be a matter of technique, appears to be full of possibilities for the surgeon who has to make a diagnosis of a case a great distance away. The trade exhibits include a collection of microscopes with a photomicroscopic camera by Messrs. Watson of High Holborn, and the Home cinematograph apparatus of Messrs. Kodak and Messrs. Pathé of France. These latter demonstrate the ease of producing living pictures in one's own home.

The exhibition is to remain open until Oct. 24th.

## A PLEASANT OFFICE.

WE have received a request from an officer of the Battalion to ascertain whether a medical man is willing to act in that capacity with Queen Victoria's Rifles (9th London Regiment). The duties would be to attend regularly one night a week from 8 to 9, the particular night being his own selection. He can dine at headquarters (56, Davies-street, W. 1) and can provide a substitute if absolutely prevented from attendance. Camp is approximately during the first fortnight in August, and though attendance is not essential, it is, of course, very preferable. In respect of pay and expenses there is a small capitation fee per man examined and pay in camp, while there is a grant on joining, representing the cost of uniform. Camp expenses are not covered entirely by the pay, but the mess subscription is three guineas, and other expenses are voluntary. We recommend a pleasant office to our readers, and applicants can address the Editor of THE LANCET.

## WINTERING IN THE SOUTH.

WE are informed by the Office Français du Tourisme (56, Haymarket, London, S.W. 1) that the Paris-Orléans and Midi Railway Companies of France, in conjunction with the International Sleeping Car Company, have arranged to run the *train de luxe*, known as the Pyrénées Côte-d'Argent Express, permanently on and from Oct. 5th next. In connexion with the 11 A.M. departure from London (Victoria), a through sleeping car, Calais to Irun, will be attached to this train until Nov. 5th. The Pyrénées Côte-d'Argent Express will leave Paris at 8.40 P.M., and will consist of *wagons lits* (Paris-Biarritz, Paris-Irun, and Paris-Tarbes) and a restaurant car from Paris to Saint-Pierre-des-Corps. The Spanish Railways have agreed to maintain a permanent connexion from Irun to Madrid which, in addition to the usual restaurant car, will include a *wagon salon* of the Sleeping Car Company.

## THE COUNCIL OF JUSTICE TO ANIMALS.

THE thirteenth annual report of this Council states that the cause of humane killing is making steady progress. The Society will lend instruments to any slaughterer willing to give them a fair trial, and has persuaded 150 councils to pass a by-law making the use of such killers compulsory. The Society also presents lethal boxes and "safeti" pistols to chemists, police officials, and other persons concerned with the destruction of unwanted or strayed dogs and cats. The work is not confined to this country, and France is rapidly adopting a killer called the Harmor, in preference to the mallet which often involves as many as ten blows. A Spanish society has been formed and aims at procuring legislation to protect domestic animals, establishing clinics for the animals of the poor, shelters for painless destruction, homes of rest for horses, and propaganda work. Particular success has been attained by the Tangier Society, and the Greek Society has been reorganised. The municipality of Rome have handed over the slaughtering of animals to the Society. The Committee appeals to the public to report cases of dogs kept chained up, to refuse to witness animal performances, to protest against menageries in local botanical gardens, to discourage the breeding of dogs suffering from respiratory complaints, and to demand humanely-killed meat at their butcher's.

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THE Eugenics Education Society has removed to the new premises of the Royal Anthropological Institute, 52, Upper Bedford-place, London, W.C. 1. (Tel.: Museum 9640.)

WE have received a catalogue from the R. H. Heward Co., Crown-road Works, East Twickenham, which fully illustrates their large stock of surgical instrument appliances and bandages. The designs shown represent standard patterns, but the firm is willing to modify appliances as their clients may wish and is especially interested in the manufacture of special articles embodying some new idea or system. The goods illustrated include a selection of trusses, abdominal supports, chest protectors, suspensory bandages, and elastic hosiery.